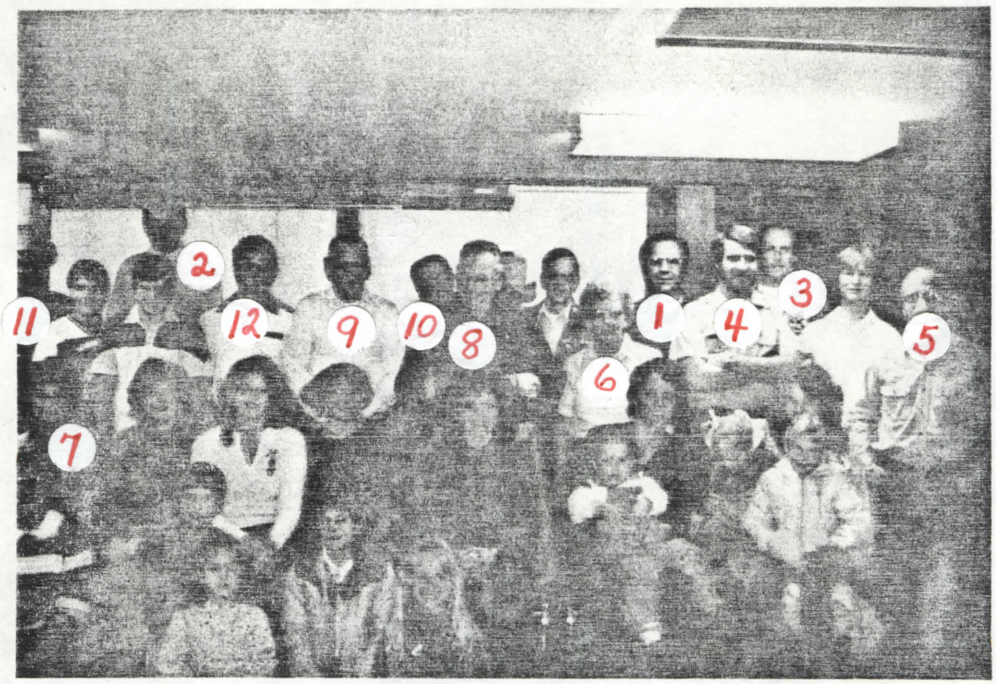
MALHEUR NATIONAL WILDLIFE REFUGE
Burns, Oregon

ANNUAL NARRATIVE REPORT
Calendar Year 1982

NATIONAL WILDLIFE REFUGE SYSTEM
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR


2
11
12
9
10
8
1
4
3
5
6
7

Joe: I thought Uniform was required

Hi Marvin

Hiring them a little young, aren't you?

YCC

BCC - Baby Conservation Corps

Nice Uniforms!

So, who is who? DRP

PERSONNEL

1. Joseph P. Mazzoni, GM-13, PFT . . . . . Refuge Manager
2. Larry R. Ditto, GS-11, PFT. . . . . Assistant Refuge Manager
   (transferred 11-20) Mattamuskeet NWR, ~~South~~ North Carolina
3. David G. Paullin, GS-11, PFT. . . . . Wildlife Biologist
4. Steven P. Thompson, GS-9, PFT . . . . . Assistant Wildlife Biologist
5. Bradley D. Ehlers, GS-9, PFT. . . . . Assistant Refuge Manager
6. W. Ruth Warneke, GS-5, PFT. . . . . Refuge Assistant
7. Arlene Miller, GS-4, PFT. . . . . Secretary
8. Norman J. Warneke, WL-9, PFT. . . . . Work Leader
9. Marvin L. Jess, WG-10, PFT. . . . . Crane Operator
10. William R. Aulbach, WG-9, PFT . . . . . Maintenance Mechanic
11. Clyde R. Miller, WG-9, PFT. . . . . Maintenance Mechanic
12. Charles L. Yriarte, WG-9, PFT . . . . . Maintenance Mechanic

always knew Joe was part of the family

MG

PERSONNEL- NOT PICTURED

1. Randy L. Aulbach, WG-5, TEMP . . . . . Maintenance Mechanic Helper
   TER: 01-30-82
2. Monte C. Davis, WG-5, TEMP . . . . . Maintenance Mechanic Helper
   TER: 01-30-82
3. Dan J. Severson, GS-5, TEMP. . . . . Biological Technician
   EOD: 02-28-82
   TER: 10-01-82
4. Shauna L. Tackman, GS-5, TEMP. . . . . YCC Work Leader
   EOD: 06-07-82
   TER: 08-06-82
5. Myra Barnes, VOLUNTEER . . . . . Biological Assistant
   EOD: 04-15-82
   TER: 10-01-82
6. Mark Bourgeois, VOLUNTEER. . . . . Biological Assistant
   EOD: 06-15-82
   TER: 09-03-82
7. Michael I. Rule, VOLUNTEER . . . . . Biological Assistant
   EOD: 03-08-82
   TER: 04-22-82
8. Carroll D. Littlefield, VOLUNTEER. . . . . Biological Assistant

REVIEW AND APPROVALS

Submitted By 2/28/83 Date

Regional Office Review Date

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PREFACE

The 183,484 acre Malheur National Wildlife Refuge is located in the Malheur-Harney Lakes Basin, 32 miles south of Burns, Oregon. The Basin has no outlet to the sea. It encompasses over three million acres and has three major water sources. The Silvies River with headwaters in the Blue Mountains, drains about 1,360 square miles and flows into Malheur Lake marsh from the north. The "Donner und Blitzen" River heads on Steens Mountain in the southeastern portion of the Basin. It drains a 1,000 square mile watershed and flows into Malheur Lake through the Blitzen Valley from the south. Silver Creek flows directly into Harney Lake through the Upper and Lower Warm Springs valleys from the north and drains a 900 square mile area. Harney Lake also receives water from Malheur Lake during high water years.

That's the name of the River! h

In the northern part of the Basin, irrigated native meadows east and south of Burns are important spring migration habitat. Waterfowl, lesser sandhill cranes, and shorebirds use this area extensively on their way north.

In June of 1980, the Harney Basin was included on the Service's national list of Important Resource Problem areas (priority No. 58). This area was included because of the significance of its waterfowl and waterbird habitat within the Pacific Flyway, and because of the potential for loss of these habitat values to changing land use practices.

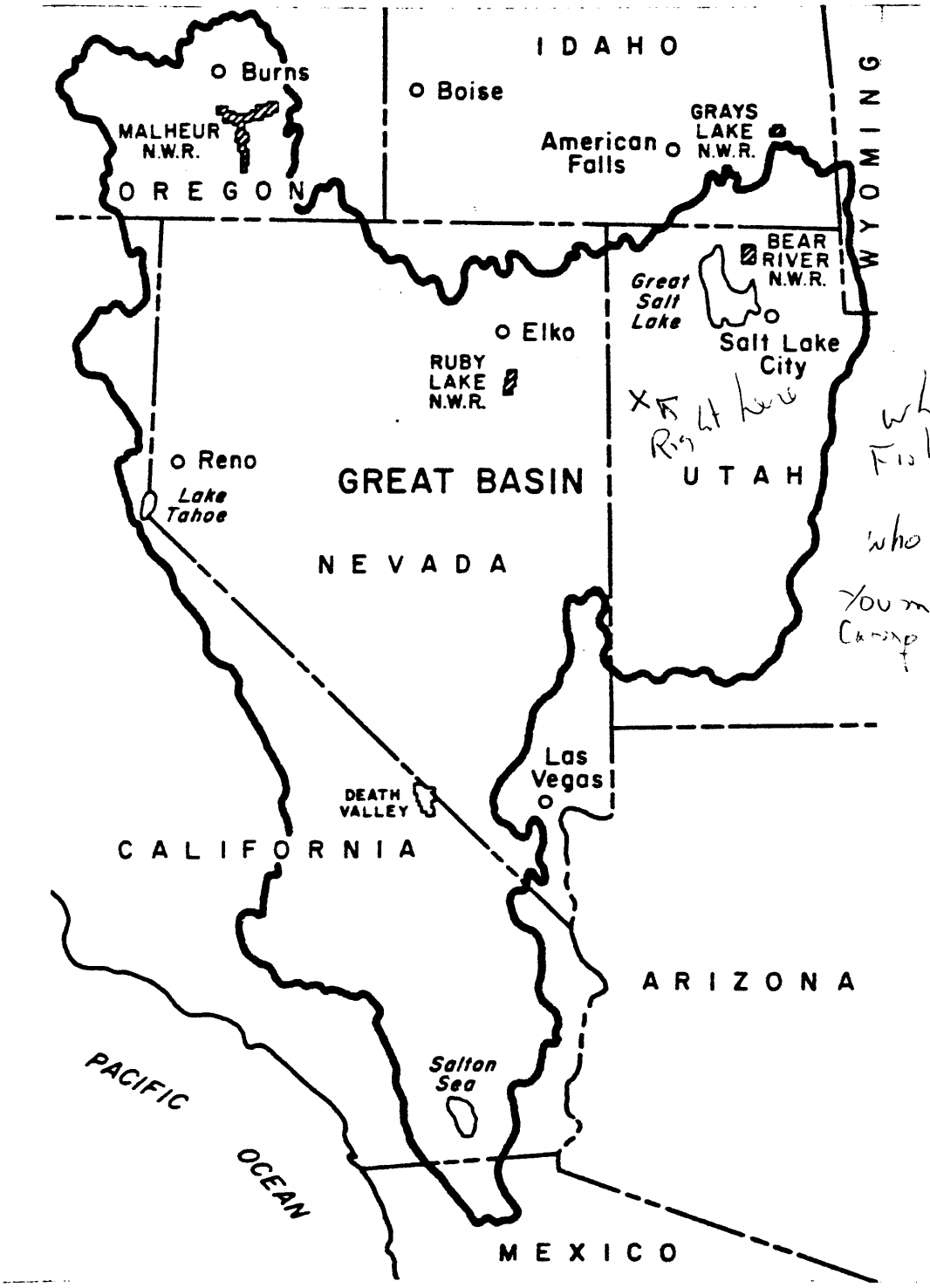


Figure 1. Location of the Malheur NWR in Relation to the Great Basin

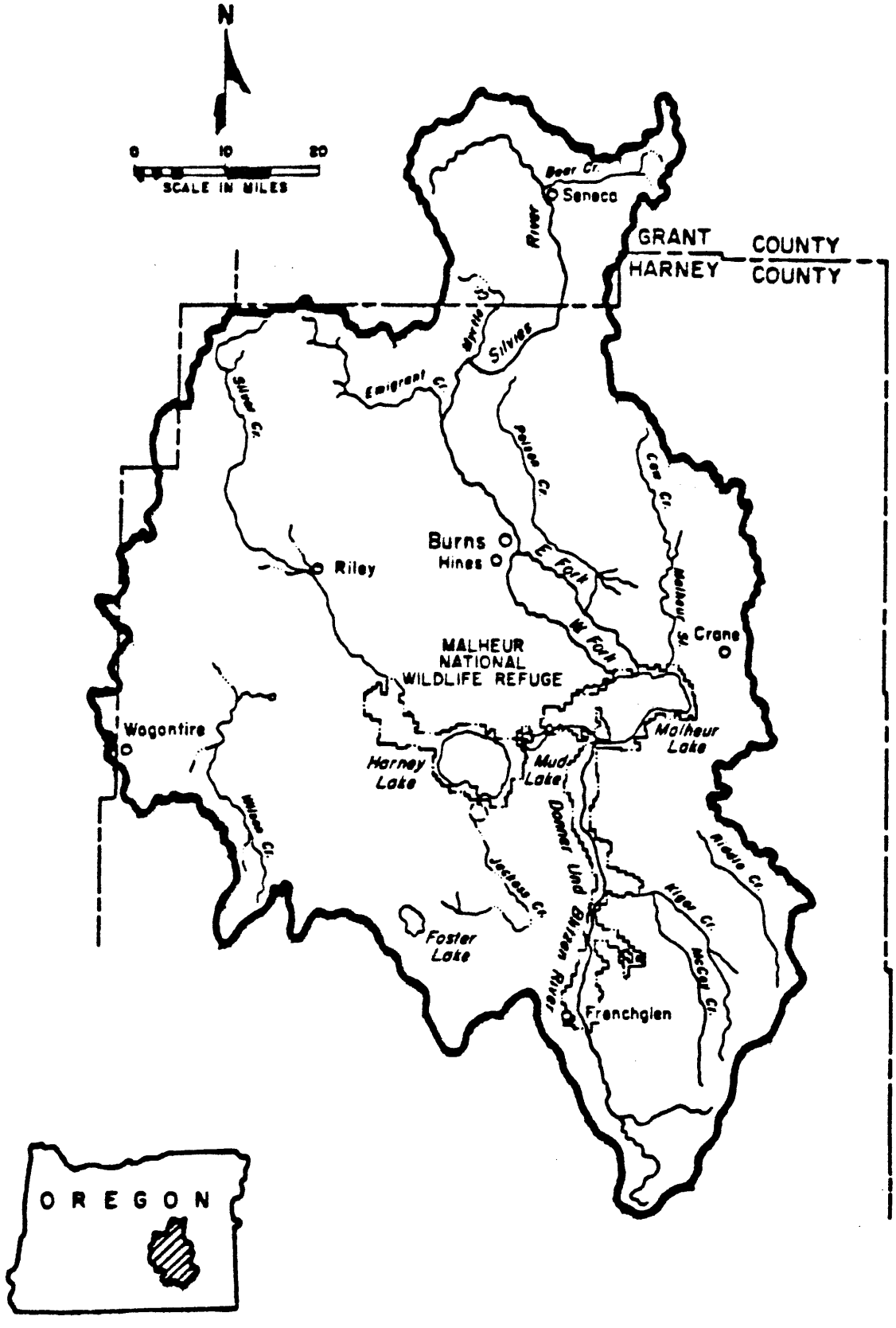


Figure 2. Malheur-Harney Lakes Drainage Basin

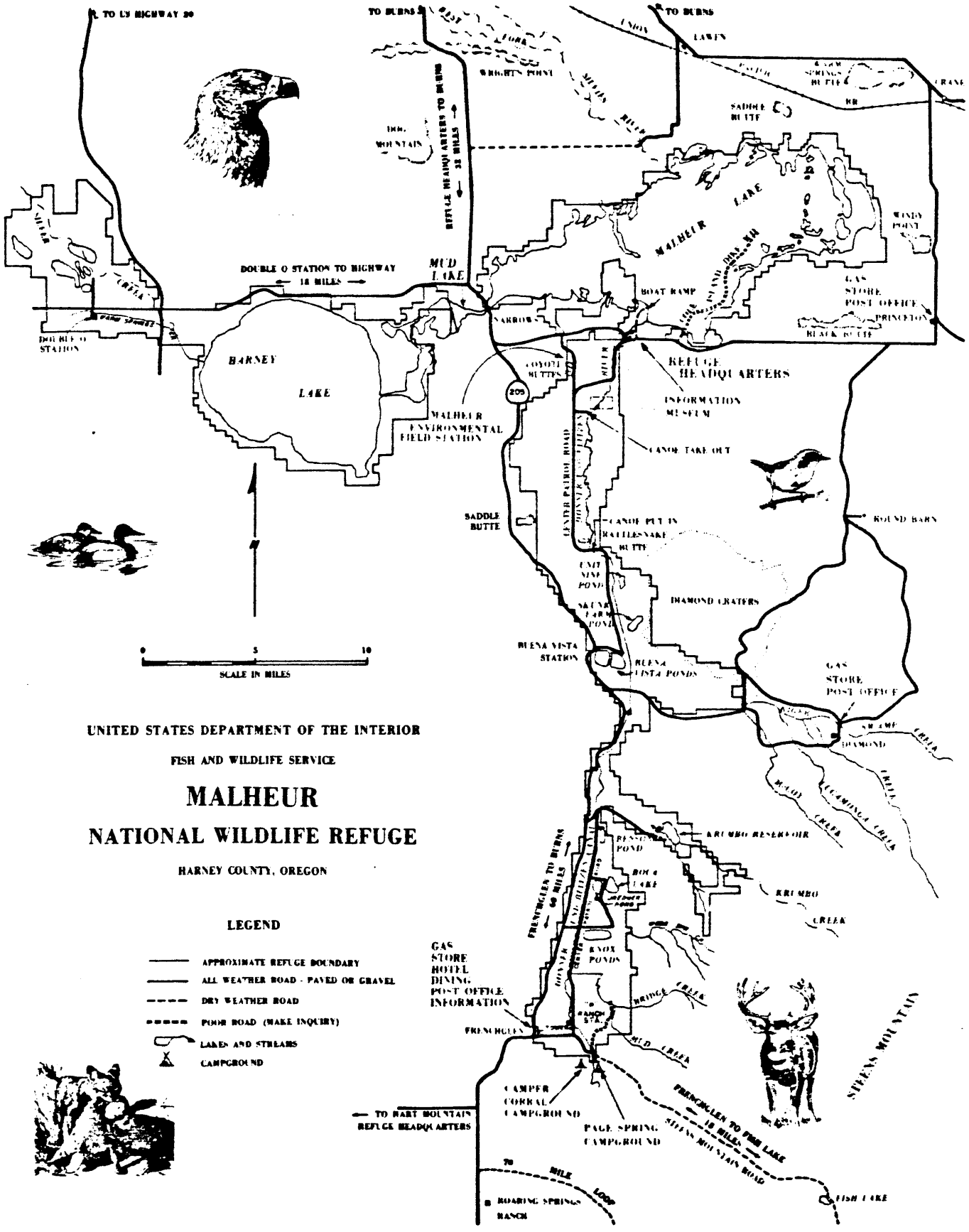

TO BURNS
TO BURNS
TO US HIGHWAY 20
WRIGHTS POINT
SADDLE BUTTE
CRANE
REFUGE HEADQUARTERS 32 MILES
DOUBLE O STATION TO HIGHWAY 18 MILES
MUD LAKE
MALHEUR LAKE
WINDY POINT
BOAT RAMP
GAS STORE POST OFFICE PRINCETON
DOUBLE O STATION
BARNEY LAKE
COYOTE BUTTES
MALHEUR ENVIRONMENTAL FIELD STATION
205
REFUGE HEADQUARTERS
INFORMATION MUSEUM
CANOE TAKE OUT
SADDLE BUTTE
CANOE PUT IN RATTLESNAKE BUTTE
ROUND BARN
DIAMOND CRATERS
BUENA VISTA STATION
BUENA VISTA PONDS
GAS STORE POST OFFICE
DIAMOND
KRUMBO RESERVOIR
KRUMBO CREEK
FRENCHGLEN 60 MILES
GAS STORE HOTEL DINING POST OFFICE INFORMATION
FRENCHGLEN
CAMPER CORRAL CAMPGROUND
PAGE SPRING CAMPGROUND
TO HART MOUNTAIN REFUGE HEADQUARTERS
FRENCHGLEN TO FISH LAKE 18 MILES
STEENS MOUNTAIN ROAD
FISH LAKE
70 MILE LOOP
ROARING SPRINGS RANCH
STEENS MOUNTAIN
0 5 10
SCALE IN MILES
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
MALHEUR
NATIONAL WILDLIFE REFUGE
HARNEY COUNTY, OREGON
LEGEND
APPROXIMATE REFUGE BOUNDARY
ALL WEATHER ROAD - PAVED OR GRAVEL
DRY WEATHER ROAD
POOR ROAD (MAKE INQUIRY)
LAKES AND STREAMS
CAMPGROUND

Figure 3.

A. HIGHLIGHTS

The year was characterized by above normal precipitation and extremely high lake levels in Malheur and Harney lakes. Malheur Lake reached a peak of approximately 77,500 acres on May 19, which is the highest level ever recorded. The high levels caused extensive flooding of adjacent private lands, which resulted in a Disaster Area declaration by the Governor and a subsequent emergency forage program involving both the refuge and the Bureau of Land Management.

Local pressures for "structural solutions" to the high water conditions led to a Corps of Engineers review of various flood control alternatives, including a dam on the Silvies River and a drain from Malheur Lake marsh into the South Fork of the Malheur River. Their final report concluded that none of the alternatives considered were either cost effective or politically acceptable, and that no further action by their agency was warranted.

The productivity of Malheur Lake was again low for most waterfowl species this year as a result of the continual high water and carp levels. This was reflected in both sago pondweed and waterfowl production on the marsh. Diver production (primarily redheads) for example, were 2,040 birds, as opposed to 20,665 in the last productive year on the marsh, 1980. Fortunately, many of the conditions that were inimical to duck and goose production, and waterfowl maintenance, were very favorable to colonial nesting species. Production of all species in that group was exceptionally good, although some were forced to relocate their nesting sites off the refuge because of the effects of high water.

The Bell-A Grazing Association land exchange was awaiting the Director's approval at the end of the year, and substantial progress had been made on the Malheur Lake public waterfowl hunting access road right-of-way easement negotiations. An exchange proposal involving approximately 2,460 acres and the last remaining private inholding on historic Mud Lake marsh was also initiated.

The Harney County lawsuit prompted by the McEwen inholding condemnation in 1978 was dismissed by Federal Judge James Burns in November, finally eliminating an issue that had served as a constant irritant in our relationship with certain local interests. wanna bet?

Completion of the Master Plan was again postponed due to other commitments. The environmental assessment was awaiting Regional Office review at the end of the year. The entire process is now scheduled for completion by mid-1983.

A major study was initiated to test the efficacy of various methods for controlling sandhill crane losses. They included

aerial gunning and trapping of coyotes, the experimental use of DRC-1339 and taste aversion for ravens.

Livestock use totalled 31,535 AUM's or 10,000 AUM's less than the previous year. While high lake levels and permit retirements were a factor, the principal reason for the decline was climatic.

Ceutorhynchus litura weevils were released on the refuge for the third consecutive year in cooperation with the Oregon Department of Agriculture. Plans are to continue with annual release of this natural predator of Canada thistle in hopes of getting a nucleus population established.

The Double-O Ranch Historic Site was officially approved for inclusion on the National Register of Historic Places in October.

Dr. Charles Henny of the Patuxent Wildlife Research Center's Pacific Northwest Field Station determined that pesticide residues in marsh and waterbird eggs taken at Malheur have declined since 1979, when eggs were first sampled.

The long-awaited re-introduction of river otters was initiated in December, in cooperation with the Oregon Department of Fish and Wildlife, with the release of three animals captured in Central Oregon. Additional releases are planned as animals become available.

Public use continued to increase, but only 1.5 percent over last year. A total of 36,395 visits were recorded, all of which were wildlife oriented.

Interesting projects & summary.
Dave Potter

B. CLIMATIC CONDITIONS

Weather continued to dominate the local scene from late December, 1981 through January. During the last week of December, 22.5 inches of snow fell at headquarters and was followed by another 9.5 inches in January. Coupled with subzero temperatures, the severe weather caused some stress related responses from many wildlife species. A barn owl die-off occurred as the deep snow cover persisted. Fifteen were found, 30 percent of them adults.

4.5 adults?
Must have been tough if the adults were dying too.

Refuge headquarters under two feet of snow.
January BDE

Malheur Lake contained approximately 53,000 surface acres on the first of the year, which was 10,000 to 15,000 acres above what would normally be expected at this time of year.

Warm, southerly winds brought rains in mid-February, and flooding conditions prevailed in all major drainages through the week of February 16th. The moderate weather stimulated the northward movement of birds into the Basin, and greater sandhill cranes, snow and white-fronted geese, pintails and whistling swans began arriving around Valentines Day.

Weather in March was generally cold, and refuge streams dropped back to normal flows. Malheur Lake was filling rapidly and exceeded 65,000 acres by the end of the month. Most meadowlands were kept dry through March in anticipation of more flooding. Our plan was to delay nesting and, thereby, minimize subsequent nest flooding. The auto tour route was closed during much of March due to wet conditions and washouts sustained during the earlier flooding.

What species is talking? ←→
How long did "it" delay?
" many eggs did "it" lay?
AMAZING! RFP

Malheur Lake levels peaked at about 77,500 surface acres (elevation 4,095.33') on May 19, which was the highest level recorded since lake level record-keeping was initiated in 1938. On June 9, 1982, Governor Vic Atiyeh declared the zone to 4,100' elevation around Malheur, Mud and Harney lakes a Disaster Area as a result of predicted high water damage to private lands located adjacent to the lakes.

Unfortunately, the weather remained cool throughout much of the summer, and lake levels didn't recede as they would normally have been expected to. On the positive side, forage conditions were excellent throughout the Basin. With the later fall rains experienced, the Bureau of Land Management was able to extend livestock use in many of their crested wheatgrass seedings, which allowed them to provide some relief for ranchers adversely affected by the high lake levels. The refuge's involvement in the emergency forage program is discussed later.

Malheur Lake reached a low of 44,200 acres on October 25, but continued to spill through the Narrows throughout the winter (the lake spills at an elevation of 4091.5'). At the end of the year, Malheur Lake stood at elevation 4095.16' (about 64,000 acres) and Harney Lake stood at elevation 4092.29' (32,000 acres). The lowest point in the floor of Harney Lake is 9.1' below Malheur Lake. With less than three feet difference between the levels of the two, little storage capacity remains in Harney Lake without serious flooding consequences for private meadowlands on the west end of Harney Lake.

Total runoff in the three major watersheds for the 1982 water year (October 1, 1981 through September 30, 1982) was significantly above normal and last year's production, with 122,900 acre feet on the Blitzen River (45 year mean annual flow through 1981 - 86,940 acre feet); a whopping 293,000 acre feet on the Silvies River (62 year mean annual flow through 1981 - 120,300 acre feet); and approximately 79,000 acre feet on Silver Creek (24 year mean annual flow through 1981 - 30,720 acre feet).

Total precipitation varied from 12.17 inches at the P-Ranch to 10.10 inches at the Double O; 11.17 inches at Buena Vista; and 11.50 inches at headquarters (10 year average through 1981 - 8.97 inches).

As of January 1, 1983, runoff predictions for the 1983 water year indicated 155 percent of normal on both the Blitzen and Silvies Rivers, and 209 percent of normal on Silver Creek! With the carryover in Malheur and Harney Lakes, such a runoff - if it developes - will likely have disasterous effects on adjacent landowners and will prolong the current unproductive conditions of Malheur Lake marsh (insofar as aquatic plant and associated invertebrate production is concerned).

C. LAND ACQUISITION

2. Easements

Verbal agreement was reached with the two affected landowners for a permanent road right-of-way easement from the Lawen county road into the central portion of the Malheur Lake public waterfowl hunting area. The right-of-way location was surveyed, an environmental assessment prepared, and a draft easement document submitted to the private parties for review. The cultural resource survey was pending at the end of the year. We are hopeful that this easement agreement can be finalized early next year. Engineering will be completed at that time for preparation of construction specifications.

It's hard to believe that some one finally got around to this. That OLD DIRT (MUD) ROAD ATE ENOUGH vehicles.

Once completed, this road would provide permanent, all-weather vehicle access to the entire central portion of the 17,000 acre waterfowl hunting area, where none now exists.

Do you want this? you can't hide from the world.

3. Other

The land exchange involving two 40 acre inholdings on Malheur Lake marsh belonging to the Bell-A Grazing Cooperative was awaiting the Director's approval at the end of the year. Refuge lands relinquished were 120 acres of greasewood/saltgrass upland located north of the marsh (an area that had never been included within the fenced administrative boundary of the refuge). The newly acquired lands will be fenced and posted as soon as lake water levels permit.

The March 22, 1971 application to the Bureau of Land Management for withdrawal of 199.90 acres of public domain land on the east side of Malheur Lake marsh was finally approved by the BLM's Oregon State Office, but was still pending final action by their Washington, D.C. office at the end of the year.

The Harney County law suit prompted by the 1978 "friendly" condemnation of the 1,518 acre Malheur Lake marsh inholding formerly owned by Walter McEwen was dismissed by Federal Judge James Burns on November 10.

The suit had alleged that the Service had failed to meet the requirements of the National Environmental Policy Act (specifically, public involvement in the acquisition decision-making process) in its handling of this acquisition case. In the process of pursuing their case, plaintiffs' attorneys had attempted to use the suit as a vehicle for discrediting the refuge's management program.

Judge Burns ruled against the plaintiffs (primarily the refuge permittee organization, The Association of Ranchers for Conservation, and the Harney County Court) on the basis that there was no evidence supporting their arguments.

The loss of this mis-guided $40,000 effort took the proverbial wind out of some rather verbal local "sails". It eliminated what had become somewhat of a rallying point for those local grazing interests bent on compromising the refuge's wildlife habitat management program.

Efforts initiated in 1981 to acquire the 788.91 acres of Oregon State Land Board owned marshlands in Mud Lake were still pending at the end of the year. The proposal involves exchange of their lands for Federal lands under the control of GSA at Astoria, Oregon, near the mouth of the Columbia River. These lands are desired by the State as part of its planned development of a deep water port. Waterfowl habitat in the Lower Columbia River desired by the Service is also involved.

A land exchange proposal involving approximately 2460 acres and the last remaining inholding on Mud Lake was initiated in October. Refuge lands being considered for relinquishment are located in the Diamond Valley and total about 1160 acres.

Completion of inholding acquisition on Mud Lake would permit restoration of this once outstanding natural marsh, which was a heavy producer of sago pondweed. It would also give the Service complete control over the entire Malheur-Mud-Harney lake system.

Sounds great! Hope it can be consumated! PP

D. PLANNING

1. Master Plan

Progress on the Master Plan was again delayed during the year due to other commitments. The environmental assessment was submitted and is awaiting final R.O. review. The final review draft of the Technical Document was completed and is to have final revisions incorporated into it early next year. The final public involvement phase will follow. The entire Master Planning process is now scheduled for completion by the end of FY 1983.

2. Management Plan

A croplands management plan, a noxious weed control operational plan, and an interpretive display plan for the headquarters visitor contact station were completed.

3. Public Participation

A meeting was held in Burns with all refuge permittees in August to discuss their concern about the refuge haying and grazing program. Regional Director Richard Myshak, ARW Larry DeBates and AWR-OR/WA District Supervisor John Doebel were also in attendance. A follow-up plan of action was subsequently developed in response to concerns voiced and distributed to all permittees.

4. Compliance with Environmental Mandates

Environmental assessments were prepared in conjunction with the land acquisition program discussed earlier.

5. Research and Investigations

Malheur NR82 - "Effects of Prescribed Burning on Major Plant Communities of the Malheur National Wildlife Refuge"-MLH-19

Objectives:

1. To evaluate the effects of prescribed fire on vegetation of at least seven different plant communities.

2. To compare spring, fall, and winter burning.

3. To evaluate the effects of various fuel and weather parameters on fire rate of spread and intensity.

4. To develop fire prescriptions and techniques suitable for meadow and marsh vegetation.

Justification

Fire is considered to be a natural component of the plant communities present on the Malheur National Wildlife Refuge. Therefore,

prescribed fire has the potential of being a desirable tool for management of refuge vegetation. Information on the effects of fire on meadow and marsh vegetation in the west is limited. This study is designed to provide basic vegetation response data for spring, fall, and winter burns.

Preliminary Results

Preliminary results indicate that aquatic species such as baltic and spike rush tend to grow taller and lodge earlier in burned areas than control plots. Total plant production as measured in lbs/acre appears to be up substantially on all burned plots versus control plots.

The final report should also give us recommendations on fire prescriptions for upland and marsh vegetation, fire management, and fire observations. Results should be available by the summer of 1983.

The research project is being conducted by Rick Young, a PhD. candidate at Oregon State University. The project is supported by Squaw Butte Experiment Station and the refuge.

Malheur NR82 - "Influence on Vegetation Structure and Composition, and Water Distribution on Nest Site Selection of Ground Nesting Birds in the Double O Area."-MLH-20.

Results are being compiled and the study should be completed in 1983.

Malheur NR82 - "Color Marking Juvenile Trumpeter Swans on Malheur NWR, Oregon."-MLH-21.

Objective:

To investigate the movement of juvenile trumpeter swans (sensitive species) by marking them with neck collars and USFWS leg bands.

Justification

Trumpeter swans were transplanted to Malheur in 1939. The first successful production was noted in 1958. From 1958 to 1982, 265 cygnets have reached flight. Despite this production and an apparent excess of breeding habitat, the number of breeding swans has remained relatively constant in recent years. By marking cygnets we hope to gain some insight into the fate of these swans after they fledge. This may lead to a better understanding of the factors limiting the refuge flock. In 1982 swans were dyed pink with Rhodamine B.

Trumpeter swans were color marked to trace their movements.
August BDE

Preliminary Results

Sightings of marked birds have been limited to the refuge except one possible sighting on Beatty Reservoir along Highway 20 between Stinkingwater and Drinkwater summits, 40 miles north of headquarters. AA01-AA10 were banded and collared in 1980. AA01 was last seen May 5, 1981 back at the pond it was raised in in 1980. AA02-04, siblings of AA01 were never seen again after banding. AA05 was located one day after banding, but never located again.

AA06-AA09, a brood of four from Benson Pond wintered on the refuge in 1980/81 and were seen regularly. The only bird seen in 1982 was AA07 (leg band reading) which had lost its collar. AA07 was with AA10 and four other trumpeter swans.

AA10 was neck-collared on Knox Swamp in 1980. This individual has been sighted 27 times and was last sighted 12-30-82. This bird has been recorded several times with an adult male (apparent father) at several different locations. On 05-06-82 the bird had apparently paired with an unmarked swan. They stayed together on Dredger Pond for the month of June. This is the first collared bird that has paired off.

AA11-20 were banded and collared during 1981. AA11-13 were banded on Unit 8 Pond as a brood. AA11 was seen several times during the fall of 1981, with the last observation 10-06-81. Bones and a collar were found below a powerline 05-13-82. AA12 has been spotted 3 times with the last sighting on 02-15-82 in the west canal 0.25 mile north of Diamond Lane. AA13 was last seen in 09-23-81.

AA14-17 were banded on Knox Swamp 08-18-81. AA14 was found dead by permittee Jim Taylor of Frenchglen near Knox Pond #3. AA15-16 were never seen again and may have died also. AA17 was collared with his brood. This adult has provided very interesting observations being sighted with his broods of 1980, 1981, and 1982 at various times of the year. AA17 was last seen 12-24-82 with its mate and the 1982 brood (AA32-34).

AA18-20 were never seen after banding on 08-18-81 (Unit 9). Unit 9 is a good pond for nesting and the first part of brood rearing, but continually goes dry for the last weeks of brood rearing. We suspect these all died due to lack of water.

AA21-35 were banded in 1982 on the refuge. AA21-24 were banded on 08-19-82 at Warbler Pond and were not seen again until December when they were seen in the Blitzen Valley. They apparently left the refuge for several months and then returned.

AA25-28 were 4 cygnets banded out of a brood of 6 from Wright's Pond. AA25, 27, and 28 were seen frequently until mid-October and then they disappeared. AA26 was never sighted after banding.

AA29-31 were banded 08-23-82 on Knox Swamp with AA17 (adult male) present. Both adults and the entire brood were seen consistently until 12-24-82.

AA35 was collared on 08-24-82 at Benson Pond and sighted several times during the fall. The last sighting was during the cold spell in December (30) when it was recorded at headquarters pond.

Of the 10 cygnets collared in 1980 only 2 young were resighted in 1982 (AA07, AA10). Of the 9 cygnets banded in 1981 only AA12 was spotted in 1982. AA11 was found dead under a powerline. AA17 was an adult when banded and was doing fine in 1982.

Survival over the first winter appears to be a serious problem. Of the cygnets collared in 1980 only 20% (2/10) were accounted for in early winter 1980. 1981 cygnets experienced a poor year also with only 33% (3/9) of the marked birds resighted in early winter. In contrast, of the 14 cygnets collared in 1982, 12 (85%) were resighted by early winter.

Handling stress factors ?

Malheur NR82 - "Effects of Cattle Grazing and Other Factors on Passerine Birds Nesting in Willow Riparian Habitat."-MLH-23.

Objective:

To determine how cattle grazing effects the passerine bird community breeding in willow riparian habitat.

Justification

In general, riparian zones are more productive in terms of biomass -- plant and animal -- than adjacent habitat, because the availability of water increases the diversity and density of plants, and the structural diversity in the community. Cattle are attracted to the riparian community because of the quantity and quality of forage available, increased palatability due to increased moisture content, drinking water, shade and shelter, and easier traveling. Grazing is considered almost universally to have a severe detrimental impact on riparian vegetation, because it eliminates the understory layers and stops stand production. This is caused by direct grazing, mechanical damage to plants above and below ground, disturbance and compaction of soils.

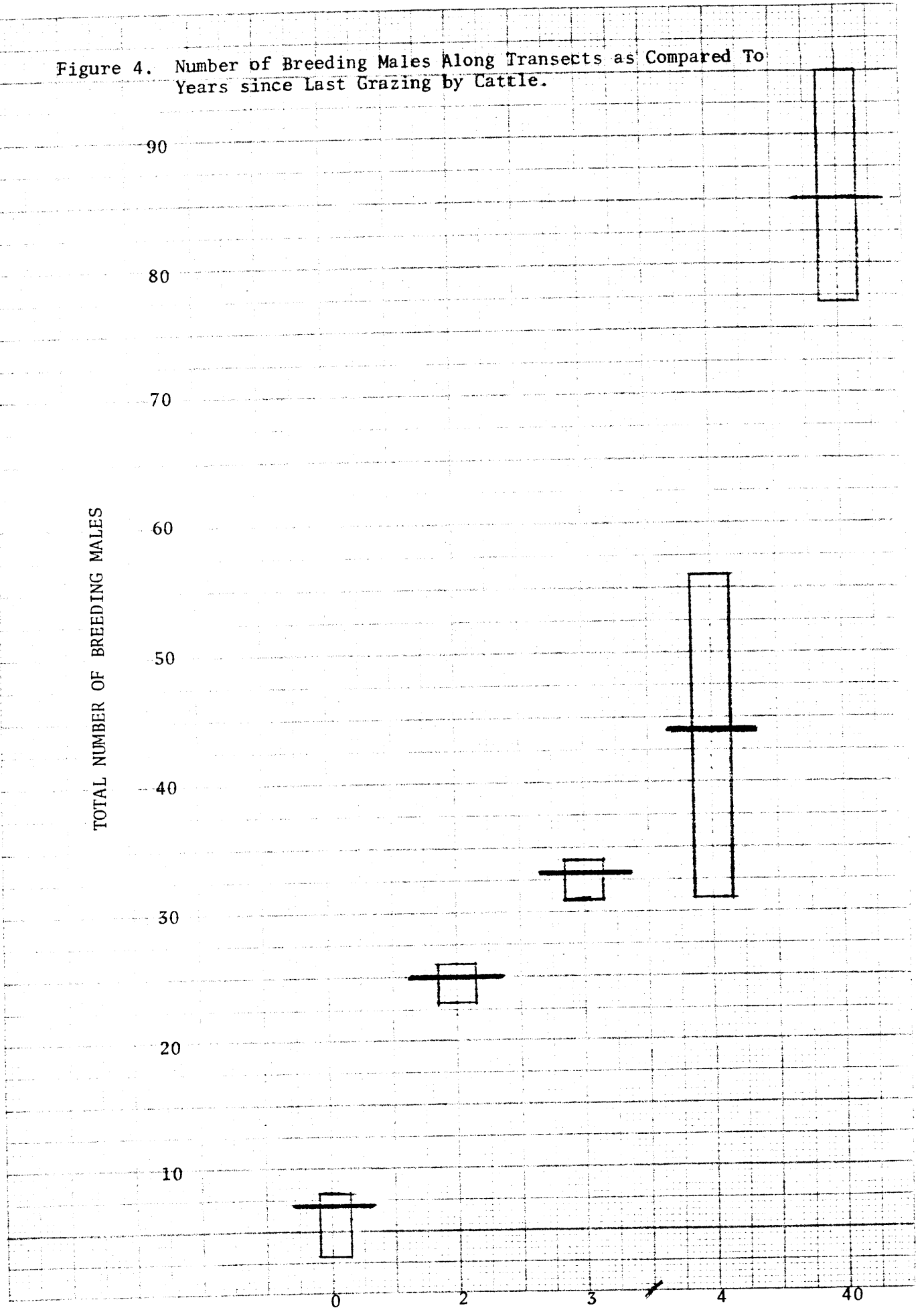
Results

Eighteen passerines and four non-passerines were recorded as holding territories on one or more of the nine transects. Red-winged blackbirds were the most abundant species, followed by yellow warblers, willow flycatchers, and song sparrows. These four species made up 87% of all territorial passerines and 76% of all territorial males. Vegetation data for the nine transects was completed in 1981 and the relative abundance of territorial males between transects was estimated.

There were no correlations between number of breeding birds and the amount of 1 meter high shrubs for all nine transects. There were significant correlations between the number of breeding birds and shrub height class (2-6 meters) for all nine trasects. There was a significant negative correlation between the frequency of grazing in past years and the number of breeding birds for all nine transects. There was a significant negative correlation between the frequency of grazing and total shrub volume.

Yellow warblers (sensitive species) increased along the nine transects as grazing decreased. They also increased as shrub volume increased. Willow flycatcher (sensitive species) numbers tended to increase along the nine transects as grazing decreased. Red-winged blackbirds showed wide fluctuations in numbers relating to grazing with no clear pattern. The transect with the least amount of grazing over the past nine years had the most birds by a considerable amount (Figure 4), but the second highest total of red-winged blackbirds was recorded on the transect with the third heaviest grazing regime.

Figure 4. Number of Breeding Males Along Transects as Compared To Years since Last Grazing by Cattle.



This project is being conducted by Daniel Taylor, a Masters candidate at Idaho State University. The project has been partially supported by the Oregon Department of Fish and Wildlife's Non-game Fund and Malheur NWR.

Malheur NR82 - "Behavior and Ecology of Double-crested Cormorants on the Malheur NWR."-MLH-25.

Objectives:

1. Determine the specific ecological requirements of the population for food, habitat, and water.

2. Determine population status.

3. Determine how cormorants are affected by environmental changes.

4. Develop a time-budget based on daily activity patterns of cormorants.

5. Assemble an Ethogram (catalogue of behavior patterns).

Justification

Previous ecological studies of double-crested cormorants are few and have been based on coastal or upper midwestern populations. Findings from these studies are not generally applicable to the populations at Malheur. On Malheur Lake cormorants nest in tules directly over water. Inland breeding cormorants more commonly nest in trees or on islands.

Preliminary Results

In the spring of 1982, the nesting colony of double-crested cormorants (Phalacrocorax auritus) on Malheur Lake appeared somewhat similar to colonies of recent years. By April 1 they began nesting at the mouth of the Silvies River in Malheur Lake. The colony held about 250 floating nests, made predominately of bulrush. As is typical of the species, the colony was not completely synchronous. A second colony of about 50 nests was located east of the gauging station on Cole Island Dike. Both colonies were deserted by June 6.

Simultaneous to the desertion, cormorants began roosting intermittently in the large willows at Benson Boat Landing (BBL). On June 6 at least 2 pairs were attending nests and over 200 cormorants roosted for the night at BBL. The number of nests at BBL increased rapidly with the height of courtship display and copulation in mid-June. The maximum number of nests (±200) was reached by July 3. Cormorants began lying in nest structures immediately, even before they were complete. Their attendance of nests was continuous and uninterrupted until a few weeks after hatch. One bird was always lying on the nest, and its mate was often standing on the nest rim or a few centimeters from it. Cormorants up to one week old are basically naked, black bodies with little to no thermoregulatory capabilities.

On July 23, airboat disturbance below the nesting colony created a situation which left the young cormorants unshaded. This apparently resulted in the death of many young cormorants. Nest failures were augumented by raccoon predation. Possibly, raccoons were attracted to the colony by the carcasses of cormorant nestlings under the nesting trees. Once they discovered the carcasses, they quickly moved into the nest, taking both live and dead young. Predation by raccoons lasted approximately two weeks. Within one week of the airboat disturbance, 100% (38 of 38) of the nests unshaded were lost while 45% (76 of 165) of the shaded nests failed (Figure 5).

These figures support the idea that the deaths were related to exposure. It is possible, of course, that some other phenomenon caused the nesting failures.

Looks Good Dallas!

The research was conducted by Dr. Deborah Davis, who was funded by Earthwatch Research Team. Volunteers were used to collect the information.

Malheur NR82 - "Experimental Control of Predation on Eggs of Greater Sandhill Cranes on Malheur NWR, Oregon."-MLH-26

The study was initiated to investigate ways to increase annual recruitment of greater sandhill cranes on Malheur NWR. Reduction in livestock grazing on the refuge in the past decade has improved crane nesting habitat and success, but young recruitment has remained below that necessary to maintain the local nesting segment of the Central Valley Population.

Objectives of the study were to determine if nesting success could be improved with limited predator control. Three study areas were established: (1) Study Area 1 (southern Blitzen Valley) - common ravens were controlled in the area with DRC-1339 (3 choro-p-toluidine hydrocloride). DRC-1339 is a selective poison that has been used successfully in controlling ravens and common crows. This compound is reportedly not lethal to raptors or mammals at dosages that kill ravens; (2) Study Area 2 (Double O Unit) - Both ravens and coyotes were controlled in the study area. Ravens were controlled with DRC-1339, while coyotes were trapped or shot to determine if crane fledging success could be improved; (3) Study Area 3 (Mid-Blitzen Valley) - Study Area 3 was used as a control and no predator control was done.

A total of 60 greater sandhill cranes nests was located in the three study areas (20 per area). Success varied from 60% in Study Area 2 to 70% in Study Area 3. Nesting success in Study Area 1 was 65%. Twenty percent of the nests were lost to unknown predators in this study area. Coyotes were evident through the nesting season, and most nests lost to unknown predators were probably taken by this species. Ravens destroyed 5% of the nests and known coyote predation accounted for 10%. Study Area 2 had the lowest success with 60%. Large numbers of predators concentrated in the area and their numbers were difficult to control. This was the only known area where nests were destroyed by raccoons (10%). Ravens destroyed

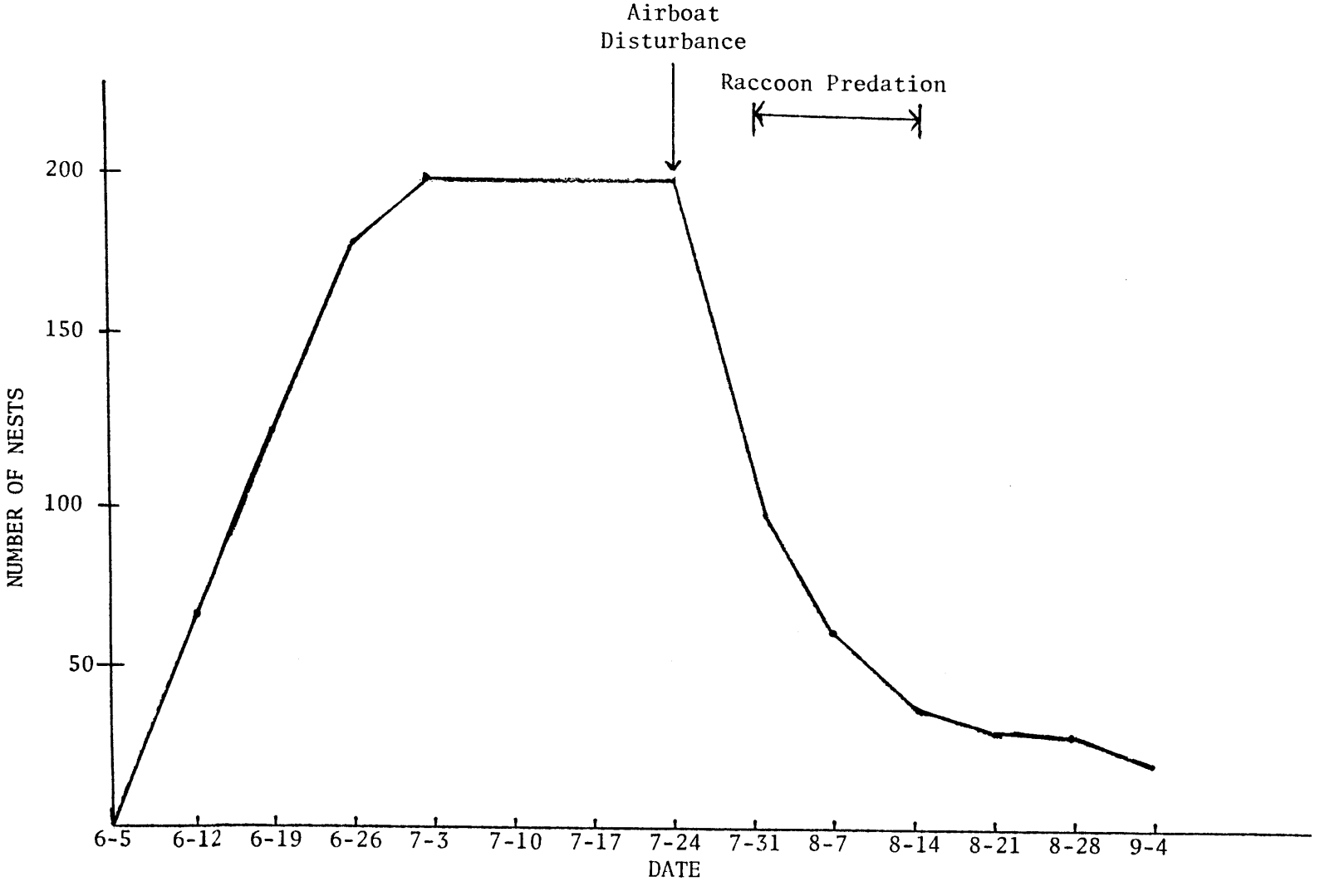


Figure 5. Number of active Double-crested Cormorant nests at Benson Boat Landing, Malheur National Wildlife Refuge, at weekly counts, 5 June to 4 Sepember 1982.

15%, coyotes 5% and unknown predators 10%. Study Area 3 had the highest success with 70%. Ravens destroyed 15% on the nests, while unknown predators accounted for 15%. There were no known nests destroyed by coyotes.

Twenty-five greater sandhill cranes fledged on Malheur NWR in 1982. Only two were produced in Study Area 1, and two in Study Area 2. The number fledged in Study Area 3 could not be determined because grainfields in the area attracted cranes from portions of the refuge not included in the study. A total of 20 young was counted in Study Area 3 on September 23.

Results from the first year of the study were the opposite of what was expected. Several factors were probably involved that contributed to the unexpected results. One particular problem was water management in Study Area 1. Water is essential for successful crane nesting and fledging. In the study area much of the nesting habitat had not received water by May 15. Pairs attempted to nest where water was available, which was usually in depressions near dikes. Dikes are regularly used by mammalian predators as pathways during the nesting season. Most nests lost in Study Area 1 was attributed to mammalian predation and this was believed partially responsible for some predation losses. Study Area 2 had large numbers of predators as it has in the past. Shortly after ravens and coyotes were eliminated, their number was replenished by newly arriving individuals. Therefore, predators destroyed eight of the 20 crane nests.

Zap 'Em Predators! PH

Continuation of the study will provide information on the feasibility of predator management for increasing greater sandhill crane productivity on Malheur NWR. Problems that developed in 1982 hopefully can be corrected in 1983, thus allowing for adequate comparisons between the three study areas.

CDC Still on the Cranes. Keep it up. BB

The principle investigator was C. D. Littlefield and the research was funded by the station.

Malheur NR82 - "Taste Aversion Conditioning of Ravens to Simulated Greater Sandhill Crane Eggs."-MLH-27

This study was conducted in conjunction with MLH-27, Experimental Control of Predation of Eggs of Greater Sandhill Crane on Malheur NWR, Oregon. The objective of the study was to determine if a non-lethal technique (taste aversion) could be used to decrease raven predation on greater sandhill crane eggs.

The study was conducted by Lowell Nicholaus who conducted similar research for his pending Doctoral degree using chicken eggs to taste avert common crows in North Dakota. In this study domestic turkey eggs were dyed to simulate a natural sandhill crane egg. The size and color of the camouflaged turkey egg very closely approximated a natural crane egg.

Dyed turkey eggs were then treated with UC 27867 (trimethycarb), the aversive agent, and placed in artificial nests at selected sites. The study area included the south side of Malheur Lake from the Narrows to Cole Island Dike and Unit 7 north of Center Sagebrush Field.

Treated eggs were replaced periodically in the artificial nests in a series of trials designed to monitor changes in rates of egg consumption by ravens.

As of yet, we have not received the report.

This research was conducted by Lowell Nicholaus, PhD candidate, North Dakota State University, Fargo, North Dakota, and was funded ($5,000.00) by Union Carbide Company, manufacturer of UC 27867.

E. ADMINISTRATION

1. Personnel

Arlene Miller was selected to fill the Secretary position vacated by Ruth Warneke. Arlene had been fulfilling the requirements of that position on a temporary basis. Her permanent appointment became effective October 4.

Assistant Manager Larry Ditto was promoted to the Refuge Manager's position at Mattamuskeet NWR, North Carolina, and departed Malheur on November 20.

Assistant Biologist Steve Thompson was selected for promotion to the new biologist position at Nisqually NWR, Washington, but won't be leaving Malheur until late January, 1983.

We feel fortunate having Arlene join us as a permanent member of out staff, and will miss Larry and Steve. Both made major contributions to our program during the five years they were here.

2. Youth Programs

This year's YCC program consisted of a work leader and six enrollees for an eight week period. Major projects completed were: goose drive trapping, willow planting, emergent planting in new ponds, fence renovation for wildlife passage, headquarters beautification, and construction of new fence. Work Leader Shauna Tackman did another excellent job in motivating the enrollees.

The Youth Conservation Corps enrollees were a valuable asset on the Canada goose drive.
June LRD

No other youth programs were in effect this year.

CDL, You are becoming an institutional asset

4. Volunteer's Program

Four people provided volunteer work during 1982. Mike Rule (March 8 to April 22) helped establish thistle plots and complete refuge photo plots. Mark Bourgeois (June 15 to September 3) completed a vegetation survey of the Knox Field. Myra Barnes assisted the biologists in several projects over a six month period. Major accomplishments included monitoring use of the refuge by trumpeter swans. Carroll D. Littlefield of Malheur Field Station donated many hours of assistance throughout the year. Carroll worked on censusing, nesting, and banding of greater sandhill cranes, conducted breeding bird surveys, and assisted whenever needed. Carroll has been associated with the refuge since 1966.

Fine guy - thanks for the help + guidance in 1967
Dave Potter

C. D. Littlefield continued his greater sandhill crane research.
October SPT

5. Funding

A summary of FY 1973 through FY 1982 funding and permanent manpower levels follows:

Base O & M*

FY	1210(MB)	1240(I&R)	6810	Total	Rehab	Permanent Positions
1973	227,600**		19,500	247,100	13,500	14
1974	227,700	28,400	19,500	275,600	43,400	14
1975	250,000	21,800	40,000	311,800	53,000	12
1976	239,200	50,700	40,000	329,900	- -	11
1977	365,900	73,200	64,400	503,500	83,000	12
1978	365,900	73,200	64,400	503,500	61,000	12
1979	431,700	62,150	64,400	558,250	430,100	12
1980	334,700	49,200	64,000	447,900	- -	12
1981	373,200	49,000	43,000	465,200	- -	12
1982	415,000	50,000	25,000	490,000	- -	12

* Includes cyclic maintenance
** Includes I&R

6. Safety

Monthly safety meetings were conducted by all members of the staff in rotation. Recent accidents and seasonal safety topics were discussed.

A BLM administered "step test" was given to all refuge employees prior to the fire season. Authorized firefighting duties were spelled out to each employee according to their scores on this physical fitness test.

All bean sprayers used for firefighting were converted to pin-type hitches this year. The ball hitches were frequently bouncing loose and this safety hazard is now corrected.

Two fatalities occurred on the refuge as a result of a traffic accident near Grain Camp Dam along State Highway #205. Buena Vista maintenanceman Charley Yriarte was summoned by the first people on the scene. He administered first aid to the sole survivor until the ambulance arrived from Burns - nearly 40 miles away. The victim later died in the Harney County Hospital. This accident illustrated the need for refuge employees to have Emergency Medical Training (EMT) in this remote area. EMT is again planned for all refuge personnel in the near future.

Three refuge vehicle accidents occurred this year. A summer temporary backed up with an open door and sprung the door on a rock. A Chevrolet Luv was totaled in a roll-over by a graduate student who was miraculously unhurt. The Gradall bucket was inadvertently swung into the cab of a pickup by one of the maintenancemen. All accidents were attributed to operator error, but the best part was - no injuries! The vehicle accidents involved drivers with little experience in the vehicle they were operating.

As a result of discussions held at safety meetings concerning these accidents, more thorough vehicle orientations will be given to new employees - especially temporaries and students.

7. Technical Assistance

The biological staff assisted with the BLM-OSU bald eagle roost study by providing roost locations and a written record of observations; assisted Squaw Butte Agricultural Research Station with a burning study; and provided numerous marked bird sightings to their originators.

This station operates the raptor rehabilitation program for Southeastern Oregon. Technical assistance and facilities were provided to the Oregon Department of Fish and Wildlife in this regard. A local veterinarian, Dr. Leon Pielstick, provides free labor while caring for our injured raptors. He has been instrumental in the survival of many birds.

Our coordination with local power companies was continued in the interest of minimizing eagle electrocution problems. Based on the incidence of bird-related power outages, Harney Electric Cooperative indicates that they feel substantial progress has been made in this regard.

F. HABITAT MANAGEMENT

2. Wetlands

For the past five years we have tried to fill impoundments and channels in meadows by March 1, ready for use by spring migrants and to attract breeding pairs of waterfowl. Water is held in the channels as late as water supplies will permit and still allow the meadows to dry and be hayed by August 10. Emergents are starting to takeover some fields. Water is standing too long on these fields. The emergent problem appears related to maintenance problems (broken dikes, control structures, etc.) and reduced evaporation due to the presence of dense residual cover.

in regard to what objective? RLP w/L use or haying product

In 1982, ponds and fields were irrigated on schedule, with a few exceptions in the Blitzen Valley. We experienced problems irrigating the east portions of South Meadow, North Meadow, Baker and Faye fields. Other problem fields were South Little Juniper, Knox, Jones, White and Diamond Swamp fields. Most of the fields west of the P Ranch were irrigated much later than normal because of irrigation problems.

Malheur Lake continues an apparent decline in productivity of submergent plants and invertebrates. This was the fifth wet year. Record high water levels in both Harney and Malheur lakes occurred this year. The center of Malheur Lake was at least 7.5 feet and Harney Lake was over 10 feet deep. The water level in Malheur Lake has been high and relatively stable since the drought of 1977. Ideal growing conditions for sago existed in 1978 and sago beds were extensive - teaming SP with invertebrates. The 1982 aquatic survey revealed very little sago and very few invertebrates were noticed (Table 1).

4. Croplands

Excellent barley crops were produced in the Diamond and West Swamp Grain fields this year. Permittee Harlan Crawford co-operatively farmed a total of 880 acres. The Mud Lake and Boca Lake fields were too wet to plant.

The main objective of croplands at Malheur is to hold Greater Sandhill Cranes in the Harney Basin. This crane population is declining and experiences a high rate of mortality on their wintering grounds in the Central Valley of California. Cranes built up to 2,346 on October 15, and all but 179 departed on November 13. Grain fields have helped hold the birds here longer and, hopefully, have reduced their mortality rate (see Section G-4.). Geese and mallards also made good use of the grain fields from October through December.

Table 1. Sago acreage, sago volume, alkali bulrush acreage compared to minimum, maximum, and mean acres of water on Malheur Lake.

	Year					
	1977	1978	1979	1980	1981	1982
Sago acreage	0	22,000	17,420	900	200	3,500
Sago Volume (ml)	0	18,658	10,750	1,090	1,670	785
Alkali bulrush acreage	0	2,110	2,000	2,650	2,340	2,000
	Acres of water in Malheur Lake.					
Minimum	16,500	28,100	40,200	52,700	36,500	52,900
Maximum	38,100	53,000	62,700	64,000+	62,000	70,000+
Mean	25,900	35,400	53,000	59,300	48,200	58,500

Pg 4
44200
77500
?

Table 2. Farming on Malheur NWR - 1982.

Field	Acres Planted	Crop	Yield (Tons)
Diamond	200	Barley	250
East Grain Camp	300	Barley	100
West Swamp	250	Barley	200
East Knox	120	Barley	50
*Sodhouse	10	Wheat	5
	880		605

*Farmed by refuge personnel.

The Sodhouse Field will eventually be converted into a native grass nursery for refuge seed. This seed is needed annually to stabilize spoil banks and other disturbed areas.

5. Grasslands

As has been noted in earlier reports, the small amount of true grassland that occurs in the margins of the refuge are managed, for the most part, contiguous with the wetlands discussed in Section F-2.

We had originally planned to offer the Dredger Field #1 crested wheatgrass seeding for grazing on a competitive bid basis, as we did in 1981. However, it was made available as emergency forage, as discussed in a later section. It was scheduled to be grazed during January and February of 1983.

Winter grazing was also authorized in the Krumbo Reservoir and Poison Field crested wheatgrass seedings under the emergency forage program.

7. Grazing

Forage conditions, as noted earlier, were excellent. The late summer and early fall rains that made dewatering efforts difficult in many parts of the refuge, created good browse conditions for geese in refuge and BLM crested wheatgrass seedings. That permitted BLM to extend summer grazing permits on their seedings for those people adversely affected by high lake levels.

Livestock use on the refuge during the 1981/82 grazing season totalled 31,535 AUM's, or 10,000 AUM's less than the level of use experienced in 1980/81. While high lake levels and permit retirements were a factor, the principal reason for the decline was climatic. The heavy snowfall and extended subzero weather experienced during the last weeks in December, 1981 forced almost all permittees to move their cattle off the refuge and back to their home ranches where they could be fed hay. As a result, this was the lowest level of livestock use on the refuge since 1941.

should seriously consider Holistic Grazing

should seriously consider no grazing!

Must consider Todays Politics! RSP

No major changes occurred in habitat management objectives over the previous year, insofar as livestock grazing was concerned.

The following table summarizes acreages of the various types of land use. The hayed/grazed category included both rake-bunched haying and grazing, and grazing only.

Table 3. Acres of habitat by land use, compared to total refuge acres suitable for livestock grazing.

LAND USE	ACRES (% OF TOTAL FOR EACH GRAZING SEASON)		
	1979/80	1980/81	1981/82
Deferred	44,146 (44%)	48,313 (47%)	55,419 (56%)
Hay only	3,184 (3%)	2,739 (3%)	2,262 (2%)
Hayed/grazed	52,402 (53%)	51,164 (50%)	42,239 (42%)
TOTAL ACRES	99,732	102,198	99,920

8. Haying

A total of 3,285 acres of native wet meadowland was hayed and hauled off the refuge.

As a result of the meeting held with all permittees in August, a plan was developed to address major permittee concerns. Actions proposed include earlier issuance of permits (1983/84 permits were issued in November and December of this year, as opposed to being issued at the end of the current grazing season), and flexible haying dates to permit earlier haying in fields heavily infested with Canada thistle. Also implemented following the meeting is a program involving agreements whereby the permittees contribute labor and materials for livestock and water management facilities, with their costs reimbursed via credits on their use bills.

Following the Governor's Disaster Area declaration in June, the Service made the decision to cooperate with the BLM and local Emergency Board by making emergency forage available to ranchers affected, to the extent that it would not seriously compromise the refuge wildlife habitat management program. The availability of several fields which had been scheduled for competitive sale made this offer feasible. A total of 2,910 AUM's of grazing and 3,609 tons of hay were offered, and 2,960 AUM's and 2,834 tons of hay were subsequently allocated. Included in this final allocation was a rake-bunched hay/winter grazing field involving approximately 1,200 AUM's of grazing that became available from an existing permittee who declined his permit (and later declared bankruptcy). The program worked reasonably well and generated good feelings within the community.

9. Fire Management

1982 was an extremely wet year. However, two wildfires occurred in late summer as the vegetation matured and finally dried out. The Spring Creek fire started on BLM land near Frenchglen and burned 160 acres of refuge land near Knox Spring. BLM fire crews extinguished the blaze. Arson was suspected.

The second fire burned three acres on North Coyote Butte adjacent to Malheur Field Station (MFS) buildings. MFS and refuge personnel quickly put out the fire. Four grade school youths admitted starting the blaze while smoking tobacco. Needless to say, the little tikes were half scared out of their wits. Two of the youths were transported to the Burns hospital for treatment of minor burns and released.

Winter burning of marsh vegetation was conducted to favor grasses and to reduce decandent emergents and brush. A flush of growth is also experienced following the release of nutrients tied up in the old vegetation. Boca Lake was dried up and then burned on February 23 and 24. Approximately 200 acres were burned in the west half of the lake bed. Darnell Pond and associated emergent patches were burned on December 8 and 9, amounting to 150 acres. Rock Quarry Field was also burned on December 8. Prescribed burning will be meshed into the vegetation management plan starting in 1983.

Rick Young has completed his field work for his PhD program on prescribed burning on the refuge. His work is already greatly benefiting prescribed burning efforts at this station (see Section D-5).

10. Pest Control

A release of Ceutorhynchus litura weevils was made on June 21 along Bridge Creek, for biological control of Canada thistle. This project is discussed in more detail in Section J-1.).

Fifty-five acres of Canada thistle, whitetop and perenial pepperweed were sprayed with 2,4-D Amine in June using trailer mounted sprayers. These noxious weeds were sprayed mostly along roads and dikes over the entire refuge. Chemical spraying is part of the Integrated Pest Management Plan prepared last year as a result of the controversy surrounding the spread of Canada thistle on the refuge.

12. Wilderness and Special Areas

There was no action on the Malheur Wilderness Proposal, which has awaited a Congressional decision since 1967.

The Double O Ranch Historic Site was officially approved for inclusion on the National Register of Historic Places on October 25, 1982.

G. WILDLIFE

1. Wildlife Diversity

Efforts have been made to increase the number of species that use the refuge by improving the diversity of habitats. Grazing has been reduced, which has resulted in an increase in shrubs and willows. This has provided additional habitat for species such as songbirds, long-eared owls, and mammals. Attempts are also being made to protect riparian zones from domestic livestock. Recent studies have shown that large blocks of deferred cover increase populations of small mammals and songbirds. This also attracts great egrets, birds of prey, and mammalian predators.

2. Endangered and/or Threatened Species

Peregrine Falcon (Endangered)

Encouragingly, there were several observations of peregrine falcons in 1982. Single adults were seen in Logan Valley, Grant County, on July 21; Steens Mountain on August 1; near Malheur Field Station on July 2; and near refuge headquarters on August 2 and 3. An immature peregrine falcon was seen on King Mountain, northeast of Burns, on August 26 (Anne Archie), and another (or same individual) was seen 2 hours later on Calamity Butte, nine miles north of King Mountain (Merle Archie). An adult was seen near the P-Ranch in December.

Bald Eagles (Threatened species)

Bald eagles continue to be a common winter and spring visitor to the refuge and the Malheur-Harney Lakes Basin. Few birds used the communal night roost north of the refuge during the mild winter of 1980/81. Use of the roost picked up considerably in 1981/82. The peak number at Rattlesnake Creek night roost was 78 (52 adults, 12 subadults, 14 unknown). A bird marked at Glacier National Park, Montana, has been observed for four consecutive winters in our Basin. Malheur, Harney, and Boca Lakes, Krumbo Reservoir and Dredger Field remain the hot spots for Bald Eagles. They continue to be opportunistic feeders eating carp, muskrats, meadow voles, rabbits, and waterfowl.

3. Waterfowl

In addition to refuge population surveys, the refuge staff continued flying the private land within the Basin. A male cinnamon teal was seen near headquarters on February 7, 13 days earlier than the previous earliest spring arrival. Generally, few waterfowl wintered in the area because of the lack of open water. One small opening in a canal contained 51 trumpeter swans on February 5, indicating their habitat was severely restricted. Normally, trumpeters are not found in such large flocks on the refuge.

Spring Migration

Similar to preceeding years, waterfowl migration began in mid-February with the arrival of pintails. Whistling swans peaked the second week in March at 11,380 and the last left in late April. Peak spring numbers and periods of waterfowl use are listed in Table 4.

The abundance of fresh water in Harney Lake was particularly attractive to ruddy ducks, where over 16,000 were observed on April 21, the highest number in recent years.

Production - Duck production was down 22% from last year. The majority of the decline occurred in redheads and mallards. The decline of redheads can be attributed to the current low productivity of Malheur Lake. There was a general lack of sago pondweed and associated invertebrates this year due to high water and high carp populations. For comparison, in 1979 we estimated 5,830 redhead pairs on Malheur Lake. In 1982 only 530 redhead pairs and 2,155 total duck pairs were estimated on the lake. In 1979 the lake was in excellent condition for waterfowl following the Rotenone spraying for carp in 1977.

The decline in mallards on Malheur Lake was undoubtedly related to record high water levels, reducing shoreline (pair habitat) and dry ground (nesting habitat). We can only speculate that irrigation problems and an effort to keep the upper Blitzen Valley dry early for sandhill cranes was responsible for declining mallard pairs. There is also some evidence pointing to continued heavy nest predation which potentially could influence recruitment. Tremendous strides have been made towards increasing residual cover for nesting birds. The increase in cover and no predator control have allowed predator populations to expand unchecked. The only nesting species above the mean for 1971-80 was cinnamon teal (Table 6).

Our production estimate of 2,375 Canada geese produced to flight was the highest for the refuge since 1971. We estimated 1,427 pairs, 4.5 goslings/brood at hatch, and 3.7 goslings/brood at flight. A total of 84 goose nests was checked, of which 45% hatched at least one gosling. The first goose brood was seen on Malheur Lake April 15. On paper it looked like an excellent year, but our production estimates are based primarily on pair estimates. In years of abundant nesting habitat it appears that a lot of geese pair up, but do not nest. Other studies have shown that when an abundance of nesting habitat is available, most one and two year old geese will pair and attempt to hold territories. This may explain why pair counts were high, but the number of broods appeared low.

Predation problems!

Table 4. Peak Spring Estimate for Waterfowl in Malheur-Harney Lakes Basin, Oregon.

Species	Number	Period
Whistling swans	11,300	March 10-28
Canada goose	14,500	March 1-9
White-fronted goose	4,400	March 10-28
Snow goose	113,000	March 17
Ross' goose	4,700	March 10-28
Mallard	3,600	April 1-15
Pintail	183,000	March 10-28
Green-winged teal	5,400	April 1-5
American wigeon	30,000	March 10-25
Northern shoveler	3,700	April 1-15
Canvasback	3,065	March 10-28
Ruddy duck	20,000	April 21-22

I still like use-days better
BHA

Make your own conversions!
RB

Table 5. Malheur Lake Waterfowl Production (Dabblers/Divers) and Aerial Brood Trend Count.

Year	Dabbler Production	Diver Production	Total Production	Brood Trend Count
1976(wet)	3,050	4,950	8,000	26
1977(Drought)	2,525	1,775	4,300	25
---------- Carp Control ----------				
1978(Wet)	3,730	11,000	14,730	109
1979(Wet)	4,225	18,400	22,625	134
1980(Wet)	5,180	20,665	25,845	35
1981(Wet)	5,970	7,455	13,425	32
1982(Record Wet)	2,680	2,040	4,720	12

Table 6. Duck Production Trends of the Major Nesting Ducks on Malheur NWR, 1978-82.

Species	1978	1979	1980	1981	1982	Average 1971-80
Mallard	5,850	5,635	7,515	5,040	2,920	4,592
Gadwall	4,700	7,650	8,185	5,780	4,700	5,840
Blue-wing/ Cinnamon Teal	7,00[illegible]	7,795	8,585	6,930	7,230	6,953
Redhead	10,200	15,750	13,525	6,845	4,490	7,552
Ruddy duck	4,125	4,570	4,505	1,975	1,080	2,823

Trumpeter swans (sensitive species) experienced a good year with an estimated 17 attaining flight on the refuge. A marking project is summarized in Section D-5. We have a difficult time holding water late in the nesting season. This causes obvious problems when our water supply diminishes by late July in most years and cygnets don't fledge until late August.

Fall Migration

Tundra swans (whistling) arrived on the refuge October 13. Their numbers steadily increased as good feeding conditions east of Pelican Island held birds through November. On November 17, 9,000 were using Malheur Lake. We seem to be holding more Canada geese each fall and winter as grainfields continue to increase in the Basin. On November 18, 10,625 were recorded on the refuge. White-fronted geese arrived in late August as usual, using primarily private land. Twenty-five were seen on Harney Lake on November 18 for the late fall date of the year. Snow geese arrived in early October. Several flocks were seen on October 7 and they peaked at slightly over 4,000 on November 18. Migration was rapid with birds not lingering for any extended period. Ross' geese peaked at 500 in mid-November (Table 7).

Use of the refuge was down for most all species of ducks. For redheads and canvasbacks, Malheur Lake is generally a major stopping point. The poor aquatic plant production in the center of Malheur Lake forced birds to feed in a restricted area east of Pelican Island. This shallow feeding area attracted fair numbers of tundra swans and canvasbacks, but the redheads tended to stay in deeper water sections of the lake. The deep water sections had no subemergents and redheads either didn't show up or moved on quickly. Harney Lake attracted a high number of common mergansers apparently feeding on fish. Normally, a high count would be several hundred, but on November 18 there was over 1,500 on Harney Lake and 235 in the Blitzen Valley. Wood duck sightings continue to increase in the area with two on September 29, 11 on October 4, and two on October 15. Three greater scaup were on the refuge headquarters pond on November 6. In addition a male white-winged scoter and a male surf scoter were on headquarters pond November 6. Both species are rare on Malheur NWR.

4. Marsh and Water Birds

The first winter record for the great egret occurred near Double O in January. Another was seen in February near headquarters. American bitterns were moving back into the area on February 22.

Record highwater levels and muskrat eatouts apparently caused the colonial species to nest in different locations than they have since 1976. In 1982, the area which was used from 1976-81 was over 7 feet deep. The water depth, ice action, and muskrat use resulted in very little residual hardstem bulrush for nesting in April and May. Double-crested cormorants used the trees at Benson Boat Landing for the first time in historic records. A more complete review of the nesting efforts of cormorants is contained in Section D-5. Great blue herons had the second highest nest estimate since records have been kept. Black-crowned

Table 7. Peak Fall Estimate for Waterfowl in Malheur-Harney Lakes Basin, Oregon.

Species	Number	Period
Mallard	25,000	Late September
Gadwall	16,350	Late September
Pintail	22,000	Early September
Green-wing teal	17,750	Late September
Cinnamon teal	10,500	Late August
American wigeon	12,000	Late August
Northern shoveler	3,000	Early September
Redhead	1,410	Late September
Canvasback	4,160	Mid-October
Lesser scaup	110	Mid-October
Ruddy duck	435	Late September
Ross' geese	500	Mid-November

Table 8. Nest Estimates for Colonial Birds in the Malheur-Harney Lakes Basin, 1982.

Species	Harney Lake	Malheur Lake	Silver Lake	Cottonwood Tree	Island Ranch Colony
Double-crested cormorants	0	360	0	0	0
Great blue herons	0	400	0	65	5?
Black-crowned night herons	25	600	100	0	100
Great egrets	9	450	0	0	100
Snowy egrets	0	100	25	0	75
White-faced ibis	0	0	0	0	900
Franklin's gulls	0	0	0	0	700
Ring-billed/ California gulls	?	?	?	0	50?

night herons experienced an average year with an estimated 600 nesting pairs. Pesticide residues in eggs taken at Malheur have decreased since 1979 (Dr. C. Henny, pers. comm.).

Table 9. Results of Pesticide Analysis of Eggs Collected at Malheur NWR (Dr. Charles Henny).

Year	Number eggs Collected	DDE(PPM) Geometric Mean	Eggs with DDT(%)
1979	20	4.70(22)	9(45%)
1980	21	2.73(14)	5(24%)
1981	--	--	--
1982	15	1.23(8)	1(7%)

Great egrets experienced a record year also with an estimated 450 nests. Snowy egrets are difficult to estimate because their nests are intermingled with great egrets. We estimated 100 nesting pairs on Malheur Lake. The first confirmed record of cattle egrets nesting in Oregon was made this year. The nest was located on the Island Ranch, just north of Malheur Lake.

Although white-faced ibis (sensitive species) and Franklin's gulls did not nest on the refuge this year, they were in the Basin in very high numbers. White-faced ibis continue to increase with approximately 900 pairs nesting on private land in 1982. One band return of 1982 was from Utah. Franklin's gulls also moved off the refuge to the Island Ranch. Both Franklin's gulls and white-faced ibis intermingle their nesting. Apparently Franklin's gulls nesting efforts are closely related to invertebrate populations. The lake was unproductive for invertebrates this year, but very productive for small fish.

As the water in Malheur and Mud lakes receded, it created ideal feeding habitat for egrets and herons. Great blue herons peaked at 1,100 in August and most had left the area by mid-November. The largest number of great egrets ever recorded in the Basin occurred September 10. Over 1,900 were observed on an aerial survey. Large numbers remained through much of October and two were still on the refuge November 26. The last snowy egrets were observed on October 11(2) after reaching a peak of 175 in early September. Black-crowned night herons virtually disappeared after reaching their peak of 1,115 in August. Only 20 were seen in October and none was recorded in November. The last white-faced ibis was observed on October 27. In August an estimated 2,500 were on the refuge for the highest number ever recorded.

White pelicans (sensitive species) were first noted March 29. By early May, populations had increased to 1,800 and peaked at over 2,600 in early September. Towards the end of September only 1,650 were using the refuge. Population estimates declined rapidly to 55 in October and 10 in November. They did not attempt nesting again, although water was at record levels.

The refuge greater sandhill crane (sensitive species) population has been stable or declining slightly for the past ten years. Refuge production continues to be poor with only 25 young cranes reaching flight from 214 nesting pairs. Other populations of sandhill cranes which are stable are averaging 10-12% annual recruitment. In 1982, annual recruitment for the refuge breeding population was 5.5%. The annual recruitment for the Central Valley Population (CVP) was 9.5% in 1982. The annual recruitment rate for 1975-82 has averaged 6.6% for the refuge subpopulation and 6.9% for the entire CVP. Nesting success on the refuge was high in 1982 with 67.5% of the nests checked hatching at least one colt. Mortality from time of hatching to fledging remains very high. In 1982, 90% of the colts died before they could fly. Our problems appear to be with predators and, possibly, water management. ZAP the 11 coyotes.. RBP

5. Shorebirds, Gulls, Terns, and Allied Species

Record high water levels reduced the amount of use by shorebirds on Harney Lake. These birds appeared to shift to the fringe of Malheur Lake as new shoreline was created. Stinking Lake also received light use.

Winter-Spring

A few killdeer wintered on the refuge, and migrants began arriving on February 12. A flock of 56 was seen on February 27, about five miles northeast of Frenchglen. Semipalmated plovers were recorded on May 7 (1) and May 14 (3). This species is now becoming a regular migrant through the refuge. Western snowy plovers (sensitive species) arrived on April 8, but little habitat was available around their regular Harney Lake nesting area. On May 14, three black-bellied plovers were on Stinking Lake and a single was seen on east Malheur Lake on May 24. Long-billed curlews and willets were in normal numbers, but American avocets and black-necked stilts appeared up in numbers. Two Baird's sandpipers were at Harney Lake on April 8. Least and western sandpipers, and long-billed dowitchers were scarce on the refuge, as few mudflats were available because of high water conditions. Ten dunlins were observed on Stinking Lake during the refuge's Big Day Count on May 14. Two marbled godwits were recorded near headquarters on May 20, which is later than normal. A lone sanderling was at Harney Lake on May 5 for the only 1982 record for this uncommon species for this area (Stuart Croghan - Susan Lindstedt). Wilson's phalaropes arrived April 26, and the only spring record for the northern phalarope was on May 14 near Harney Lake when 8 were seen.

California gulls arrived on March 11, but few remained in the Basin to nest. Franklin's gulls arrived on April 14, but no major buildup occurred. Two Bonaparte's gulls were seen on May 6, followed by 3 on May 14 and 10 on May 25. Forster's terns arrived April 23. Several colonies had been established in the Double O area by May 31. A colony of 61 Forster's terns was observed on Warbler Pond on May 19. Caspian terns were more prevalent than usual. Two were seen April 22 for the 1982 early record. Twelve were seen near Harney Lake on May 12. Black terns arrived on schedule and were much more abundant than usual. Colonies were scattered throughout the refuge and on private lands. The refuge's third record for the common tern occurred on May 11 (Dan Severson) and the fourth on May 28 (Ginny Oesterla).

Summer

Three semipalmated plovers were on Stinking Lake on July 10 along with 27 western snowy plovers. Six additional plovers were seen on a small pond near Double O on June 21. These widespread observations indicate the dispersal of the species from their normal nesting area in Harney Lake because of high water levels. Greater yellowlegs had returned by July 13.

As noted earlier, for the first time in recent years, Franklin's gulls did not nest on the refuge. They moved north of Malheur Lake to the Island Ranch. We estimated 900 nests in the colony with 75% nesting success, 3.0 young/nest, producing approximately 2,000 young.

Fall

The normal shorebird concentration areas (Harney and Stinking lakes) were inundated during the period and few shorebird observations accumulated. Black-bellied plovers were seen on September 2 and October 13. A total of 82 long-billed curlews was observed migrating from the area on August 30, later than normal for this species. Pectoral sandpipers were first seen on September 13 and were last recorded on October 11. Apparently, Southeastern Oregon is on a major migration route for the species. One Baird's sandpiper was at Harney Lake on September 2. Two marbled godwits were observed on September 14. Northern phalaropes were recorded on three days between September 15 and September 29.

An immature Franklin's gull was seen on the refuge October 27 for a very late date. Two Forster's terns were seen September 21, later than normal. Caspian terns lingered in the Basin through September 15.

6. Raptors

Spring

Turkey vultures arrived March 11, eight days earlier than normal. A female goshawk was observed near headquarters on March 26. There was only one sighting of the sharp-shinned hawk, that on April 24. Cooper's hawks were scarce throughout the period, with only two recorded sightings. There were only three records for Swainson's

hawk after it first arrived on March 25. Dates were April 9, May 16, and May 19. The last record for rough-legged hawks was on April 30. A pair of ferruginous hawks spent most of the period feeding on gophers and ground squirrels near refuge headquarters; however, their nest has not been located. Black-tailed jackrabbit populations were extremely low, except in localized areas. Marsh hawks were present in usual number, but nesting was delayed somewhat by cold weather. Many were still incubating at the close of the period. Ospreys were recorded on April 3, April 23, May 3, and May 30. Prairie falcons were more evident than usual. Three were present from mid-April through May 31 near headquarters, far from any nesting habitat. American kestrels were common in the appropriate habitat.

Barn owls experienced a general die-off in the Basin during the winter of 1981/82. This was apparently common in many parts of the Great Basin. Twelve of the fifteen dead owls found were submitted to the National Wildlife Health Laboratory in Madison, Wisconsin. The results indicated that all were emaciated. The cause of death of two was trauma associated with predation, probably by great horned owls. Of the birds analyzed for DDE, lead, mercury, or arsenic, all showed low levels not considered hazardous to their health. Enough barn owls survived to provide several nesting observations. At least four pairs were known to be nesting, but no extensive searches for nest sites were made.

Summer

Sixty-four turkey vultures were seen on the P Ranch tower on June 25, compared to 63 on June 30, 1981. It cannot be determined if the species is actually declining in the Basin or if the species has dispersed to other roost sites. Breeding bird surveys do show a decline on one route through the Stinking Water Mountains from the 1970's. Five were seen going to roost in trees at Roaring Springs Ranch in Catlow Valley on July 16, indicating some P Ranch birds may have moved to that area. One ferruginous hawk was seen throughout the summer near refuge headquarters. A lone osprey spent the summer on Malheur Lake, for one of the few summer records.

Short-eared owls were not as common in the meadows in 1982, but were extremely common in July along highways. The birds were feeding on small rodents as they crossed the highway. Like burrowing owls, several were found dead after colliding with vehicles.

As in past years, 22 golden eagle breeding territories were examined on and near the refuge boundary. We examined territories at least two times during the nesting season; in March and late May to early June. The percentage of breeding territories which fledge at least one young dropped sharply from 72% in 1981 to only 32% in 1982. It is likely this decline in productivity is directly related to a decline in jackrabbit populations. Of 22 breeding territories checked, 18 were active, and seven produced young. The seven successful nests fledged 11 young (1.57 young/successful nest).

Fall

Turkey vultures were migrating through the area in September. A total of 51 was seen on September 13. Twenty-five consistently roosted in large cottonwoods 1.5 miles SW of headquarters in September. A goshawk was recorded near headquarters on August 8, for a very early record. An adult was also seen in the desert lowlands north of the refuge on October 18. There were three records for sharp-shinned hawks (August 25, October 4, November 19) and three records for Cooper's hawk (August 13, August 28 (2), September 14 (2)). The earliest refuge record of the rough-legged hawk was attained on October 7, 3 days earlier than the previous early arrival. Golden eagles were more prevalent around the refuge grainfields and bird concentration areas, as jackrabbits continue at a low ebb of their cycle. Marsh hawks were moving through the area in large numbers on September 13. There were eight observations of ospreys on Malheur NWR between August 21 and October 13. A merlin was recorded near Frenchglen, Oregon on October 19 for one of the few records in recent years.

Quarterly Raptor Surveys

Quarterly raptor surveys were completed in 1982. The surveys involve 14 routes totalling 225 miles, covering Malheur Refuge, the balance of the Harney Basin and Steens Mountain (fall only). The surveys were first conducted in 1975 and were designed to coincide with four major periods: 1) mid-winter (January); 2) spring migration (April); 3) nesting (June); and fall migration (August-September). The results of the 1982 surveys are summarized in Table 10).

One of the clearest and most dramatic trends that is developing since the initiation of the surveys is the steady increase in corvids: crows, ravens, and black-billed magpies. New record high counts were observed for all species on all counts except wintering ravens (winter of 1981 had the highest raven count with 331). Increased conversion of sagebrush lands to agriculture, primarily cereal grains, appears to be enhancing both crow and raven numbers. Another possible factor which may be contributing to the increase in corvid numbers is the curtailment of poisoned meat baits, which were a common method of controlling coyotes both on and off the refuge prior to 1972.

The Harney Basin continues to be a major wintering area for rough-legged hawks, although numbers vary erratically with the severity and duration of the winter. New high counts were observed for bald eagles and prairie falcons for the winter count.

Red-tailed hawk numbers for the summer period have been increasing steadily for the past seven years. The Swainson's hawk, once the most common nesting buteo, no longer nests on the refuge. Causes for this startling disappearance are unknown, but habitat destruction and pesticide use on wintering grounds (South America) is suspect.

Table 10. Raptors Observed on 1982 Quarterly Surveys

	Winter	Spring	Summer	Fall
Turkey vulture	0	55*	26°	79°
Sharp-shinned hawk	0	1	0	0
Unidentified buteo	3	17	3	3
Red-tailed hawk	32	38*	63*	60
Swainson's hawk	0	13*	4	26
Rough-legged hawk	179	16	0	0
Ferruginous hawk	0	3	0*	0
Golden eagle	24	20*	6	7
Bald eagle	16*	1	0	0
Unidentified eagle	0	1	0	0
Northern harrier	49	83*	54°	42
Prairie falcon	11*	11*	6	3
American kestrel	4	23	12	52*
Great-horned owl	0	0°	1	1
Burrowing owl	0	7*	0°	0
Short-eared owl	0	2	1	0
Barn owl	0	1*	0	0
Northern shrike	5	0	0	0
Loggerheaded shrike	3	6	10	6
Black-billed magpie	45*	6*	7*	19*
Common crow	1*	25*	4*	300*
Common raven	173	196*	286*	842*
Total	545	525	483	1,440

* = Highest density ever recorded for the count period (raptor/100 miles surveyed).
° = Lowest

Summer-fall counts for turkey vultures were the lowest ever recorded, but no clear trend has been established.

After completing raptor surveys in five of the past eight years, they are proving to be a very valuable tool to monitor not only changes in raptor numbers, but also habitat changes within the Basin, particularly the conversion of native brushlands to agriculture and the conversion of brushlands to grasslands by range fires.

7. Other Migratory Birds

The spring migration of passerine birds continues to be a major attraction to visitors. Favorite birding areas include: refuge headquarters, Benson Pond, P Ranch, and Page Springs area along East Canal up to Bridge Creek.

Winter/Spring

Common flicker numbers were the lowest since 1976 and hairy woodpeckers were completely absent. Downy woodpeckers were seen in Burns on February 16 and at refuge headquarters on February 25 and 26. The average arrival for Say's phoebes on the refuge is February 27. They arrived on February 11 this year. Many horned larks were attracted to highways, and again, road kills were prevalant. Tree swallows arrived on February 20, one day later than the earliest arrival record of 1981. Black-billed magpies wintered more commonly than usual. At least six common raven roost sites were active in 1981/82. The species continues to be one of the most common wintering birds. Known night roost and maximum counts are as follows: Rye Grass Lane (215), Catlow Valley (310), and Narrows (700+). Other roosts exist on Juncus Ridge (Malheur Lake), Devine Canyon (Highway 395), Diamond Swamp and one near Crane. Currently, good counts do not exist for the other roosts. One common crow was seen in January, but spring migrants did not arrive until February 22.

Merle Archie observed and heard a Bewick's wren near Frenchglen on January 8. That represented the first record in the Basin since 1876, and the first refuge record. A sage thrasher at Frenchglen on February 26 was one day earlier than the previous earliest record. American robins began moving back into the area between February 16-20 after being virtually absent through the winter. A varied thrush was seen February 26, somewhat earlier than normal.

A western meadowlark was observed January 9 for one of the few winter records, and migrants had returned by February 22. A rufous-sided towhee was at headquarters on February 21, four days earlier than the previous arrival record. Sage sparrows arrived February 22, indicating this species arrives much earlier than previously thought. On January 9, four lapland longspurs were seen mixed with a flock of horned larks near refuge headquarters. This represents the first record since 1876 and the first for the refuge. Probably, if a thorough search was

made of large lark flocks in Southeastern Oregon in the winter, this species' recorded status would change. Several snow buntings were seen among the flocks of horned larks about 10 miles south of Burns in January.

Spring/Summer

On May 14 a Big Day Count was held with nine participants and 143 species counted. A poor-will was seen by Marty St. Louis near Frenchglen on May 31, Common nighthawks arrived on schedule (May 22). Four Vaux's swifts were over refuge headquarters on May 12. Black-chinned hummingbirds are becoming regular in southeast Oregon after the species was first recorded in 1969. This spring, single individuals were seen on May 12 and May 30. Three males were recorded on May 16. Calliope hummingbirds were seen on May 14 (1) and May 16 (2). It is surprising the species is not seen more often on the refuge, as it is a common nester in the Blue Mountains, north of Burns. Lewis' woodpecker (sensitive species) seemed to be fewer in numbers than normal. Few hairy woodpeckers were seen, but downy woodpeckers were recorded on several days in March.

Eastern kingbirds arrived May 20, but no substantial build-up had been noted by the end of the period. Unfavorable weather conditions in late May were believed responsible for the delay. A gray flycatcher was at headquarters on April 29 and a western flycatcher was there on May 31 (Steve Laymon). The third refuge record for the purple martin was established on March 15 (Dan Severson). Previous records were in 1918 and 1971. Brown creepers were recorded sporadically between March 5 and May 14. A house wren was nesting at refuge headquarters, one of the few records of nesting on the refuge.

Black and white warblers continue to increase in the area. Single individuals were noted at the following locations: one at refuge headquarters on May 7; one at Fields on May 29 (Harry Nehls, Tom Crabtree, Jeff Gilligan); and the same observers saw another near refuge headquarters on May 29. Tennessee warblers are also becoming a regular migrant in Southeast Oregon. Two were on the refuge on May 14, two near Frenchglen on May 29 (Tom Crabtree, Harry Nehls) and one on May 31 at refuge headquarters (Steve Layman). An ovenbird was near headquarters on May 29, and a northern waterthrush appeared near Fields on May 29 (Tom Crabtree, Harry Nehls, Jeff Gilligan, C. Schmidt). An adult male rose-breasted grosbeak was seen near Sodhouse Dam on May 27.

Fall

Vaux's swifts were recorded on four days during the fall. The earliest record was September 7; the latest September 22. A black-chinned hummingbird was seen near headquarters on September 2 (Merle Archie). A white-headed woodpecker appeared at headquarters on October 12 and remained for about one week. This was the first record for the lowlands; however, they are common in the Blue Mountains north of the Basin (Larry Ditto and Brad Ehlers).

Table 11. Malheur National Wildlife Refuge, Oregon, Spring Big Day Count - May 14, 1982. (143 species).

	Headquarters Malheur Lake	Blitzen Valley	Page Springs Steens Mtn.	Double O	Total
Horned grebe	--	--	--	2	2
Eared grebe	--	96	--	2000	2096
Western grebe	6	25	--	30	61
Pied-billed grebe	4	16	--	6	26
White pelican	4	--	--	81	85
Double-crested cormorant	2	1	--	10	13
Great blue heron	4	5	--	5	14
Great egret	27	51	20	86	184
Snowy egret	2	--	1	2	5
Black-crowned night heron	1	10	--	15	26
American bittern	1	7	--	--	8
White-faced ibis	25	3	--	2	30
Trumpeter swan	--	7	2	2	11
Canada goose	107	446	200	40	793
Snow goose	--	--	--	66	66
Mallard	7	124	20	60	211
Gadwall	16	86	10	50	162
Pintail	2	9	2	18	31
Green-winged teal	--	6	2	4	12
Blue-winged teal	1	7	--	1	9
Cinnamon teal	67	245	50	85	447
*European wigeon	--	--	--	1	1
American wigeon	--	8	2	16	26
Northern shoveler	--	76	5	45	126
Redhead	38	88	--	85	211
Ring-necked duck	--	--	--	3	3
Canvasback	3	15	--	20	38
Lesser scaup	--	2	--	2	4
Bufflehead	--	9	--	3	12
Ruddy duck	2	42	--	100	144
Common merganser	--	--	2	--	2
Turkey vulture	1	8	15	--	24
Sharp-shinned hawk	--	1	--	--	1
Red-tailed hawk	4	13	5	11	33
Swainson's hawk	--	3	--	--	3
Ferruginous hawk	--	--	1	--	1
Golden eagle	--	7	5	2	14
Marsh hawk	12	18	25	25	80
Prairie falcon	--	1	2	1	4
American kestrel	1	19	10	--	30
California quail	9	4	5	1	19
Ring-necked pheasant	3	16	20	8	47
Chukar	--	--	75	--	75
Sandhill crane	20	56	25	15	116

Table 11. Malheur National Wildlife Refuge, Oregon, Spring Big Day Count - May 14, 1982. (143 species). (Continued)

	Headquarters Malheur Lake	Blitzen Valley	Page Springs Steens Mtn.	Double O	Total
Virginia rail	--	1	1	1	3
Sora	--	1	5	2	8
American coot	197	492	2	350	1041
Semipalmated plover	--	--	--	3	3
Snowy plover	--	--	--	14	14
Killdeer	9	21	10	18	58
Black-bellied plover	--	--	--	3	3
Common snipe	9	17	10	2	38
Long-billed curlew	--	9	15	8	32
Spotted sandpiper	--	--	1	2	3
Willet	9	11	--	1	21
Dunlin	--	--	--	10	10
Long-billed dowitcher	--	9	--	9	18
Western sandpiper	--	--	--	65	65
American avocet	4	8	--	100	112
Black-necked stilt	--	2	--	1	3
Wilson's phalarope	12	7	--	35	54
Northern phalarope	--	--	--	8	8
California gull	--	--	--	20	20
Ring-billed gull	--	5	--	1	6
Franklin's gull	--	1	--	5	6
Bonaparte's gull	--	--	--	4	4
Forster's tern	--	30	--	10	40
Caspian tern	--	--	--	12	12
Black tern	--	307	--	20	327
Rock dove	--	--	5	--	5
Mourning dove	11	51	35	5	102
Barn owl	--	2	--	--	2
Great horned owl	5	17	3	1	26
Short-eared owl	1	4	--	3	8
Rufous hummingbird	--	--	--	1	1
Calliope hummingbird	1	--	--	--	1
Belted kingfisher	--	--	2	--	2
Common flicker	1	10	20	--	31
Lewis' woodpecker	--	1	2	--	3
Downy woodpecker	--	1	--	--	1
Western kingbird	4	4	--	3	11
Ash-throated flycatcher	--	1	--	--	1
Say's phoebe	4	2	--	1	7
Willow flycatcher	--	2	1	1	4
Western wood peewee	--	2	--	--	2
Olive-sided flycatcher	--	--	1	--	1
Horned lark	--	--	20	2	22
Violet-green swallow	--	3	100	--	103
Tree swallow	51	67	10	1	129
Bank swallow	1	--	--	-	1

Table 11. Malheur National Wildlife Refuge, Oregon, Spring Big Day Count - May 14, 1982. (143 species). (Continued)

	Headquarters Malheur Lake	Blitzen Valley	Page Springs Steens Mtn.	Double O	Total
Rough-winged swallow	9	1	2	--	12
Barn swallow	96	171	15	130	412
Cliff swallow	98	461	35	155	749
Black-billed magpie	6	13	10	1	30
Common raven	30	22	5	15	72
Common crow	--	1	--	--	1
Bushtit	--	--	2	--	2
Red-breasted nuthatch	4	2	--	3	9
Brown creeper	--	1	--	1	2
House wren	--	--	3	--	3
Long-billed marsh wren	10	45	--	30	85
Canyon wren	--	--	10	--	10
Rock wren	--	5	5	--	10
Sage thrasher	--	--	35	5	40
American robin	5	85	40	2	132
Hermit thrush	--	--	--	1	1
Ruby-crowned kinglet	1	6	--	1	8
Cedar waxwing	--	19	--	--	19
Loggerhead shrike	--	--	2	8	10
Starling	77	157	10	15	259
Solitary vireo	--	1	--	--	1
*Tennessee warbler	--	2	--	--	2
Orange-crowned warbler	--	3	1	1	5
Nashville warbler	1	2	--	2	5
Yellow warbler	6	61	15	15	97
Yellow-rumped warbler	3	34	10	26	73
Townsend's warbler	--	--	--	1	1
MacGillivray's warbler	--	1	--	1	2
Common yellowthroat	5	3	20	20	48
Wilson's warbler	5	16	--	4	25
House sparrow	1	7	10	--	18
Western meadowlark	7	30	50	15	102
Yellow-headed blackbird	195	583	20	40	838
Red-winged blackbird	193	750	10	153	1106
Northern oriole	2	5	5	2	14
Brewer's blackbird	49	238	15	95	397
Brown-headed cowbird	4	25	5	75	109
Western tanager	6	7	5	1	19
Lazuli bunting	2	1	2	2	7
House finch	--	--	10	1	11
Pine siskin	--	--	25	--	25
Green-tailed towhee	--	--	3	--	3

Table 11. Malheur National Wildlife Refuge, Oregon, Spring Big Day Count - May 14, 1982. (143 species). (Continued)

	Headquarters Malheur Lake	Blitzen Valley	Page Springs Steens Mtn.	Double O	Total
Rufous-sided towhee	--	1	--	--	1
Savannah sparrow	1	1	35	25	62
Vesper sparrow	--	--	7	--	7
Lark sparrow	5	20	150	10	185
Sage sparrow	2	--	--	6	8
Chipping sparrow	3	--	10	10	23
Brewer's sparrow	--	6	75	10	91
White-crowned sparrow	--	2	--	--	2
Golden-crowned sparrow	1	--	--	--	1
Song sparrow	10	66	20	15	111

*Unusual spring migrants

On September 25, Jeff Gilligan, Richard Smith, and Owen Schmidt located a "red-breasted" form of the yellow-bellied sapsucker at Benson Pond. This was the first record for this "form" on Malheur NWR. A Williamson's sapsucker male was at refuge headquarters on October 3. Hairy woodpeckers were more common in the lowlands than normal, with several records in October and November.

On September 13, a mass migration of violet-green, tree, and barn swallows occurred on the refuge. One barn swallow was still on the refuge on November 18. A flock of 400+ common ravens was seen three miles north of Princeton. This species has been increasing in the Basin for the past three years.

A red-eyed vireo was banded at headquarters on September 17, and other records were obtained for the species on September 8, 9, and 15. The first Oregon record for the Canada warbler was recorded on September 25. Richard Smith, Jeff Gilligan, and Owen Schmidt found the individual on this date. On September 26, C. D. Littlefield captured, banded, and released the bird. The same bird was recaptured on October 2. A northern waterthrush was near refuge headquarters on September 22 (Merle Archie), and an American redstart was at headquarters on September 13.

Two yellow-headed blackbirds were still on the refuge October 11. A male rose-breasted grosbeak was banded at headquarters on September 22 and an immature Harris' sparrow was found on the refuge October 16 (Merle Archie).

Good info, read like Am. Bird ... maybe you could use initials at end of section instead of repeating full names. (DL)

8. Game Mammals

Big mule deer bucks are a constant refuge attraction, with the Blitzen Valley and Double O the best areas to observe them. The refuge deer surveys were discontinued in 1980 following the closure of the deer archery season. State wildlife biologists include the Blitzen Valley in their survey routes and their data is sufficient for our management needs. Pronghorn antelope were seen on several occasions, mostly in the Double O and in the west side of the Northwest Big Sagebrush Field.

10. Other Resident Wildlife

The increase in cover along riparian zones and uplands for waterfowl and cranes has also greatly increased populations of other mammals. Before 1977, raccoon sightings were very uncommon. Gradually, raccoon sightings have increased and it was not unusual to see between three to five in a single day on Malheur Lake. They were observed eating dead muskrats and eggs. Muskrat numbers appeared to have fallen considerably from the peak of 81/82. Our aerial census was not complete as of this writing.

The winter of 1981/82 was very tough on California quails and chukars (a snow depth of 22" combined with a record cold temperature of -27°F on January 6). The six weeks of snow in 81/82 combined with a wet spring in 1982 reduced chukar populations by 70-90%. Ring-necked pheasants did better, but also experienced a poor year.

California quail had a difficult time surviving without artificial feed during the severe winter of 1981-82. January BDE

Black-tailed jackrabbit numbers appeared to be declining in 1982. Some areas seemed to hold pockets of rabbits and such was believed the case around Harney Lake. It is interesting that golden eagle production declined in 1982, apparently responding to the scarcity of their primary prey. We have no transects for coyotes, but their numbers appeared to be high in 1981 and declining in 1982. Animal Damage Control killed 147 coyotes in the Double O unit. Approximately 50 were shot near the Dunn Ranch and Mud Lake in 1982.

Table 12. Total Number of Jackrabbits Recorded Along Quarterly (January, April, July, October) 11 Mile Road Transects for 1980, 1981, and 1982.

	1980	1981	1982
Double O	174	164	42
Center Patrol Road	130	77	6
Princeton Road	83	213	8

11. Fisheries Resource

Carp populations in Malhuer Lake have continued to increase since the 1977 drought and Rotenone treatment, although the number of carp caught in gill nets was lower than previous results. These low numbers probably reflect the increased size of the lake (29,000 acres more than 1981). Also, most of the carp spawned in flooded sagebrush, rabbit brush, and greasewood. Large concentrations were noted in the brush during netting. Small carp and catfish die-offs were noted in April.

Table 13. Carp Sampling comparisons

Date(Netter)	Square Foot Effort	Number Carp	Carp caught/ Square Foot
10/76(Griffith)	390	7	0.018
to	480	10	0.021
08/77(Griffith)	350	33	~~0.943~~ 0.094
Rotenone/Drought 9/77	- - - - - - - - - - - - - - - - - -		
09/80(Ehlers)	400	24	0.060
09/81(Ehlers)	400	44	0.110
09/82(Ehlers)	400	10	0.025

Table 14. Fish Caught in Nets on Malheur Lake, 1980, 1981, 1982.

Species	1980	1981	1982
Carp	63	108	13
Mirror carp	1	1	0
Pumpkinseed sunfish	9	7	1
Yellow perch	5	17	33
Brown bullhead	10	40	13
Sucker	2	4	7
Chub	0	4	10
Crappie	0	0	1
	90	171	78

Approximately 5,000 legal size rainbow trout were released in the Blitzen River from Page Springs Dam to P Ranch by the Oregon Department of Fish and Wildlife in April and early May.

Good deal! KG

12. Wildlife Propagation and Stocking

An effort is currently underway to reintroduce river otters. Otters were historically present in the Basin with the last records of any frequency in the late 1930's. Mrs. Dunn, a refuge neighbor, has reported seeing an otter in 1948 for our latest reliable record

near the refuge. We are now working with the Oregon Department of Fish and Wildlife attempting to establish a population of otters on the refuge. The state pays a trapper $50.00 per head for live otters caught on the Deschutes River, approximately 160 miles west of the refuge. They are also catching otters at the ODFW Wizard Falls Fish Hatchery. The otters are transported to Bend by the state. We pick up the otters and deliver them to the release site in less than 24 hours.

great!

This is a good idea. Hope they can find each other

To date, three river otters have been released on the refuge. The first otter (adult male) was released December 6, at the display pond. It was resighted December 20, at Benson Boat Landing, 1.0 mile northeast of the release site. The second and third otters were released December 10 and 11. The second otter was an adult female and the third an immature of unknown sex. Radio tracking was considered, but dropped due to cost. Additional otters will be released to the Blitzen as they become available.

very good. DGPotter

This is the first river otter reintroduced on the refuge. December JPM

14. Scientific collection

Black-crowned night heron eggs (15) were collected from birds nesting in Malheur Lake. The eggs were transferred to Dr. Charles Henny of the Pacific Northwest Field Station, Patuxent Wildlife Research Center in Corvallis, Oregon. He is monitoring egg shell thinning and pesticide levels (See Section G-4 and Table 9).

15. Animal Control

The only animals removed were in association with the Sandhill Cranes Predator Research Project (MLH-26).

16. Marking and Banding

C. D. Littlefield continued his research on the Central Valley Population of the greater sandhill cranes (see Section D-5). He banded and marked (colored leg bands) 22 cranes, including three juveniles.

Volunteers under the direction of C. D. Littlefield banded songbirds with the use of mist nets at refuge headquarters during migrations. Their banding uncovered the first record of a Canada warbler in Oregon.

Fifteen trumpeter swans were banded, collared and dyed pink to trace their movements/mortality (see Section D-5). All were local young except for one member of a nesting pair.

Canada geese young of the year were banded in June using drive-trap methods on flightless birds. A total of 82 geese were banded in the East Buena Vista and East Knox ponds. This banding is an effort to monitor harvest rates and locations.

Mallard quotas were doubled this year to 200 each age/sex. Mallard juveniles were extremely hard to come by again this year. Swim-in traps and barley were used to capture ducks primarily at Mud Lake and West Buena Vista Pond.

Table 15. Summary of Waterfowl Banding at Malheur NWR, 1982.

Trumpeter Swans:

AHYM	AHYF	LM	LF
0	1	5	9

Canada Geese:

	AHYM	AHYF	LM	LF
West Buena Vista	0	0	18	6
East Knox	8	7	20	23
	8	7	38	29

Ducks:

	AHYM	AHYF	HYM	HYF	Total
Mallard	397	217	73	62	749
Pintail	51	25	14	3	93
Gadwall	0	0	3	1	4
Green-wing teal	2	0	0	0	2
Cinnamon teal	9	0	1	0	10
Blue-wing/Cinnamon teal	0	4	0	2	6

Twenty-eight black-crowned night herons, 92 great egrets, 54 snowy egrets, 227 white-faced ibises, and 5 great blue herons were banded in a nesting colony five miles due north of the Cargill Ranch on the north side of Malheur Lake. The banding was accomplished in an attempt to locate their wintering grounds and associated pesticide problems that may occur.

17. Disease Prevention and Control

A minor botulism outbreak occurred on Unit 6 of Malheur Lake in late August. An estimated 50 mallards and 200 pintails died.

Several dead western grebes were noted in Malheur Lake in the spring of the year. Specimens were sent to the Madison Health Lab and were diagnosed as "emaciated". The specimens were then transferred to Patuxent for pesticide analysis. Their work is not complete as of this writing. According to Dr. Louis Locke of the Madison Health Lab, a large die-off of grebes occurred all across the Western states last spring. The cause is unexplained, but pesticides on the wintering grounds is suspected.

The muskrat population crashed in the spring and specimens were also sent to the Madison Health Lab. Tularemia was suspected, but ruled out by the Lab's analysis. Dr. Locke thought it was Errington's disease, but he needed fresh tissue for verification.

Dr. Locke also conducted a Waterfowl Disease Workshop this year in Region One. He did an excellent job of conveying important material to field personnel. Paullin, Ehlers, and Thompson attended these sessions.

H. PUBLIC USE

1. General

Total visits were up 1.5% over last year. Visitation is now nearly up to the 1978 level (pre-high gas prices). Public use peaks in May because numbers of bird species are at their peak and the vast majority of Malheur's visitors are birders. The mosquitoes come out in mid-June and only nesting species of birds are left at that time, so visitor use tapers off as the summer progresses.

September and October use has nearly doubled during the last two years. This trend is largely due to the excellent grain crops which have held crane and waterfowl concentrations. Visitors are also advised that the crowds are absent during this period. This leveling off of visitor use is desirable because peak visitor use in May is approaching the point where wildlife has started to avoid visitor concentration areas.

Table 16. Estimated Total Visits, 1975 - 1982, Malheur NWR *

Year	Visits	Year	Visits
1975	34,490	1979	31,325
1976	35,810	1980	26,185
1977	29,260	1981	35,885
1978	37,865	1982	36,395

* Estimates obtained using a standard procedure developed after McCurdy.

2. Outdoor Classrooms - Students

Malheur Field Station (MFS) college classes using the refuge as an outdoor study area account for most of this category. MFS is located on the refuge at the former Job Corps Center site, four miles west of headquarters. Classes offered vary from anthropology to entomology. The majority of the courses are in natural resources and they use the refuge during their field studies. Students from MFS and local grade schools also assisted with refuge banding projects.

3. Outdoor Classrooms - Teachers

A teacher workshop was planned in co-operation with MFS. The class will be advertised through their brochure and taught by both MFS and local resource personnel in the fall of 1983. These workshops have attracted about a dozen local instructors in past years.

5. Interpretive Tour Routes

A total of 13,600, or 37 percent of refuge visitors used the 42-mile Blitzen Valley self-guiding auto tour route. However, the cost of the tour leaflet has now reached sixty cents each, for an annual cost in excess of $4,000.00. The leaflet will be rewritten in 1983 to reduce individual leaflet costs and to make the route's interpretive material more supportive of the wildlife objectives of the refuge.

Students from the local Sodhouse Grade School helped band Canada Geese at Buena Vista Pond.
June BDE

6. Interpretive Exhibits/Demonstrations

An Interpretive Exhibit Plan for the headquarters office was prepared and is currently being reviewed by R.O.-I&R staff. These displays will adorn the walls of the visitor reception area. Basically, they will orient the visitor to the refuge and explain what there is to do, and they will be designed to answer visitors' most frequent inquiries.

The Benson Memorial Museum at headquarters contains nearly 200 bird species mounted in life-like poses. They were prepared by George Benson and Patricia Hansen in the 1930's and 40's. This attraction again accounted for the largest number of visitors - 51%. Many visitors use the museum to learn their birds and many favorable comments are generated by this use. More interpretation is planned for this building, as funds permit.

7. Other Interpretive Programs

Slide programs on "Greater Sandhill Cranes", "General Orientation", and "The Ecological History of the Harney Basin" were shown to visitors at regularly scheduled hours during the April-September period. These programs were prepared by refuge personnel and shown by volunteer Myra Barnes on weekends. Myra handled the office reception duties this year. Saturday afternoons in May usually attract one hundred birders to refuge headquarters. This area is a perennial hotspot for a great variety of songbirds.

The Refuge General Leaflet was rewritten and printed this year. Unfortunately, its legibility is poor, due to lack of color contrast.

8. Hunting

The Malheur Lake Waterfowl Hunt opened on October 16 and closed on January 16, 1983. Daily bag limits were seven ducks and three Canada geese. The only species restriction was a daily bag of two either/or canvasback or redhead. Table 17 gives a comparison with past years' hunts.

An influx of gadwalls on Malheur Lake satisfied most of the hunters. The lake did not hold many ducks, due to a lack of sago pondweed. One hundred fifteen hunters showed up on opening day and 80 on the second day. Opening weekend accounted for 45% of the hunter visits for the entire season. Access was limited because of high water. Hunters were able to use the Saddle Butte and Narrows access roads to launch boats. Shallow water froze over on November 11, and an eight-inch snowfall on November 21 accompanied freeze-up of most of the marsh for the season.

The location of the Blitzen Valley pheasant hunting area was changed this year. Greater sandhill cranes were being disturbed by hunters in grain fields planted specifically for the cranes in the Upper Blitzen Valley. These fields were also used by Canada geese and mallards through the pheasant season. The hunting area was moved to the north end of the Blitzen Valley to eliminate this disturbance. The hunt was held during the last nine days of the regular state pheasant season, as it has been since 1974 (11/21-28). Sixty-four hunters harvested 75 roosters on the opening day. Success averaged 1.1 birds per man throughout the season. Nine inches of snow discouraged many hunters from using the area on the second day of the season. However, most of this snow had melted by the second weekend. Marsh areas were frozen over for most of the hunt, giving hunters access to these usual pheasant sanctuaries. In short, the crane and waterfowl disturbance was minimized and a high quality hunt provided.

9. Fishing

The fishing season on the refuge coincides with the state trout season. This year, it ran from April 24 through the end of October. Krumbo Reservoir, the Upper Blitzen River and Lower Bridge Creek were open, as in past years. Rainbow trout are the primary species sought, although there are a few black bass and crappie in Krumbo Reservoir. Twenty-five fishermen tried their luck on Krumbo on opening day and averaged two rainbows per man in the 19-22 inch category. No trout under 13 inches were seen. Approximately seven percent of Malheur's visitors engaged in fishing.

Table 17. Malheur Lake Hunting Data

Year	No. of Hunters	Birds Bagged Per Hunter	Cripples Per Hunter	Total Bag	Total Harvest	#1 Species in Bag	No. & % of #1 Species
1956	1161	2.0	UNK	2287	UNK	Mallard	754 (33%)
1957	1423	2.4	UNK	3464	UNK	Canvasback	1662 (48%)
1958	1143	2.2	UNK	2537	UNK	Mallard	761 (30%)
1965	1725	1.8	UNK	3029	UNK	Pintail	727 (24%)
1966	1486	2.1	UNK	3101	UNK	Am. Wigeon	1240 (40%)
1967	1743	2.0	UNK	3549	UNK	Gadwall	1278 (36%)
1968	NO HUNT - - - - - - -LOW WATER - - - - - - -LIMITED CARP CONTROL						
1969	1597	1.6	UNK	2539	UNK	Mallard	762 (30%)
1970	2075	2.8	UNK	5739	UNK	Canvasback	1664 (29%)
1971	1608	2.8	.61	4503	5484	Gadwall	991 (22%)
1972	1564	1.3	.37	2033	2612	Gadwall	853 (42%)
1973	521	2.2	.39	1146	1349	Gadwall	401 (35%)
1974	555	2.3	.50	1277	1555	Gadwall	690 (54%)
1975	962	1.8	.37	1732	2088	Gadwall	606 (35%)
1976	593	1.7	.41	1008	1251	Gadwall	343 (34%)
1977	NO HUNT - - - - - - -LOW WATER - - - - - - -CARP CONTROL						
1978	1140	4.6	.60	5261	5945	Am. Wigeon	1578 (30%)
1979	1110	2.9	.60	3262	3928	Gadwall	620 (19%)
1980	614	2.9	.50	1780	2087	Gadwall	801 (45%)
1981	460	1.8	.40	830	1014	Gadwall	307 (37%)
1982	420	3.1	.40	1290	1458	Gadwall	875 (68%)

I believe it's one of them "hybrid" geese. W

Dead Goose

Ought to mount that one for your H.Q.
JB

This goose was observed on a census flight over Malheur Lake and shot by a hunter near Crane three days later. You tell us what it is!
November

BDE

11. Wildlife Observation

This activity was enjoyed by 34% of our visitors. The majority of this use is simply people driving on refuge roads and observing wildlife. The other major activity in this category is bird watching at refuge headquarters. Many of our visitors in April, May and June are expert birders. They are interested in observing as many species as possible in a single day or weekend. The major attractions in the fall are the concentrations of greater sandhill cranes and waterfowl in the grain fields, and the large mule deer bucks in the rut in early November.

This station presently has a canoe route on the Lower Blitzen River. The route follows a deeply eroded section of the river through predominantly sage habitat. Visibility and the opportunity to view wildlife is limited. The Master Plan calls for moving this canoeing experience to a section of Malheur Lake near the mouth of the Blitzen River, where wildlife observation will be a regular part of the trip.

17. Law Enforcement

Three men from the Bend area were apprehended in a co-operative refuge and state police effort for taking big game on the refuge. The whole episode started when Maintenance Mechanic Charles Yriarte observed a vehicle pass his road grader with a large buck in it. Charlie got the vehicle license number and reported it to

refuge headquarters. Dave Paullin and Brad Ehlers were searching refuge roads for drag marks, etc., when a flock of magpies pinpointed a fresh gut pile. Distinctive tire prints were found and the suspects' license number was then put out on the state police frequency. Kim Reaney, local state police game officer stopped the vehicle headed to Burns and Paullin and Ehlers assisted in the ensuing investigation of the gut pile, deer, vehicle, etc.. The three men eventually ended up in Justice Court, charged with taking two four-point mule deer bucks off the refuge. The case was based on Charlie's observation, vegetation in the deer carcasses compared with that in the gut pile, hoof material compared with that at the kill site, and the vehicle tracks. They were found guilty and assessed fines of $2,000.00, had their hunting/fishing licenses suspended for two years, and had 20-day jail sentences suspended. All three subjects could not appear at their trial because they were in jail charged in connection with a Bend area car theft ring. They have appealed the deer case to the Circuit Court and the trial is expected to occur in April, 1983.

The first conviction on arrowhead collecting was made on the refuge this year. Maintenance Mechanic Clyde Miller and Assistant Manager Larry Ditto apprehended two men after they were told earlier in the day that arrowheads were protected on the refuge. They each paid a $50.00 fine.

State Police Officer Kim Reaney helped us enforce refuge game laws on a regular basis throughout the year. His efforts were welcomed and effective.

Table 18. Convictions Resulting from all State and Federal Apprehensions on Malheur NWR, 1982

Take Big Game in Closed Area	3
Collecting Artifacts	2
Vehicle in Closed Area	1
Hunt in Closed Area (Ducks)	2
No Fishing License	3
TOTAL	11

2. Rehabilitation

Major rehab to the meadow irrigation system included installation of a three-foot riser, four-foot riser, two-foot screw gate, and two 18" culverts in the Stubblefield Canal and Rockford Lane area. Two culverts were replaced along Jim Green Lane. A wooden bridge was replaced with a five-foot culvert in the North Center Field. A three-foot riser was installed on the north side of East Buena Vista Pond to improve water level control.

An old wooden bridge was replaced by a 24" culvert on Five-mile Road. A four-foot riser was installed on the South Diamond Swamp and a 24" riser and 12" screw gate were installed in West Grain Camp. A 36" culvert, with a flapper valve, was placed on the northeast corner of the West Swamp Grain Field for irrigation and draining purposes. The Knox Spring flume over the East Canal was repaired. This warm water is directed onto Bridge Creek Field for Canada Goose browse production and loafing habitat.

The fences around Barley Field and on the north end of North White Field were rebuilt. The Warm Springs fields were consolidated. Interior fences were removed and main fences repaired/replaced. Additional fencing through the Barnes place completed fencing for grazing treatment in this area. Approximately three miles of road were gravelled along the Auto Tour Route and the North Double-O road. Rip-rap was placed along the dike on the south end of Dredger Field and the north dike of West Buena Vista Pond. Fences were replaced on the west end of the Wrango Field and the east side of Dredger Field #2.

The William L. Finley/Stanley G. Jewett stone monument was moved from below the visitor parking lot to a location adjacent to the office entrance trail. This plaque and stone monument memorializes the two individuals most responsible for establishment and early development of the refuge, and can now be viewed by visitors as they walk along the paved trail from the parking lot into the headquarters office and visitor area.

3. Major Maintenance

Major repairs were completed on fences in the Lower Krumbo, North Meadow and Mud Creek fields. About twenty small breaks were dug out and repaired along the various canals and the Blitzen River during the year. Several old fenced hay corrals were removed from the Red House and Stinking Lake fields.

Major ditch cleaning was accomplished in Krumbo Valley, Bridge Creek Field, Big Deer Park Field, Big Juniper Field, Warm Springs Field, Tipton and East Grain Camp fields. The spoil from these operations was leveled and hand-seeded during the winter. Hand seeding proved to be ineffective and thistle took over the spoil

banks in most areas. Native grass seed, a small seeder-packer, and a small tractor are needed to accomplish spoil bank stabilization without noxious weed problems. Funding is being sought for this purpose.

For a small ditch like this, try the ND farmer method of using a moldboard plow in both directions, making a deadfurrow ditch. It could be much faster and more economical. DEB

Bill Aulbach cleaning ditches in the Warm Springs Field with Gradall borrowed from Lower Columbia NWR.
February LRD

Flood damage to Witzel Lane and the Page Springs road was repaired after a surge of high water in the winter. A few hours of cat work required on BLM property was accomplished by trading equipment use. All major refuge roads were graded in the spring and again in the fall.

The P Ranch residence was painted outside. Major plumbing repairs were completed in Quarters #14. The museum interior was painted.

4. Equipment Utilization and Replacement

A Honda three-wheel ATV was acquired from the Lower Columbia River Refuge Complex and used by the P Ranch maintenanceman for water level monitoring. This vehicle saves gas and time while traveling to the numerous small water control structures in this area of the refuge.

Bill Aulbach returning from his water control duties near Frenchglen.
June LRD

A new slip-on pumper was received and a D-4 cat ordered through the C.O's special fire appropriation. Both will be valuable additions to our prescribed burning and fire control programs.

The brakes and transmission on the Galion grader were overhauled by refuge personnel. Most of the heavy equipment at this station is outdated and requires frequent maintenance.

5. Communication Systems

Two-way radios are mounted in most vehicles, with a base station in the office at headquarters. This system has saved many man-hours and made a more efficient operation of this vast refuge. Good radio coverage is now afforded the entire refuge, except for a few areas near Frenchglen, which are shadowed in canyons. Repair and maintenance of our system is performed under contract by the Burns District BLM radio technician. This arrangement has worked well and repairs are done in a prompt and efficient manner, on an actual cost reimbursable basis.

good system

The Audio-Sine, Inc. AM Radio Information System installed two years ago worked well throughout the year. The system is used to inform visitors about the refuge and surrounding area. Visitors are asked to tune to 1610 on their car radio by an informational sign along State Highway 205 leading to refuge headquarters. The system hadn't worked right since installation, due mostly to poor quality and the absence of a suitable local AM radio

maintenance and repair capability. A Bend, Oregon radio technician who services the local Burns radio station was finally brought in. He looked at the equipment, stated it was a poor quality unit, modified it, and gave us operational tips. The unit was on GSA contract, so brand name choices were not available. The repairman advised us to change tapes monthly, keep the machine regularly lubricated, and maintain a light bulb in the unit for heat during periods of cold weather. The System now works well with these changes, and is a valuable component of our visitor information program. Hopefully, a higher quality unit will be available when this unit is due for replacement.

6. Energy Conservation

EMC Engineers, Inc. of Denver prepared an energy study for the station. The firm was under contract by the Regional Office in Portland. The purpose of the study was to identify, analyze and develop a list of projects which would save energy. They supplied the station with the report, and the recommended projects will depend on future funding.

Table 19. Vehicle Mileage Usage, 1979-1982.

Year	Mileage	% Change
1979	165,939	---
1980	143,400	-14
1981	111,292	-33
1982	137,320	+22

The increase in mileage in 1982 is due mainly to providing vehicles to three volunteers and one graduate student. In addition, increased mileage was needed to operate the greater sandhill crane research project.

J. OTHER ITEMS

1. Cooperative Programs

A site was again provided on the refuge to release weevils Ceuthorhynchus litura which attack Canada thistle. The last two years' plantings apparently failed due to flooding of the site while the weevils were dormant under the soil surface. This year's plantings were placed on a high and dry site along Bridge Creek. Hopefully, this site will prove a better test of biological control of Canada thistle. This introduction was a cooperative effort between the Oregon Agricultural Department, the Harney County Agricultural Extenstion Service and the refuge.

Weevils were planted along Bridge Creek to test their effectiveness in Canada thistle control.
June BDE

Refuge personnel assisted the Soil Conservation Service in reading snow courses on Steens Mountain in January, February, and March. These readings, coupled with those from the mountains north of Burns, provide an estimate of water supplies for the following spring. General irrigation plans for the refuge can be made based on these estimates.

Weather data was again recorded for the National Weather Service at all stations. The headquarters station records evaporation as well as temperature and precipitation.

Numerous contacts were made with the Corps of Engineers (COE) and the U.S. Geological Survey during the year concerning the high water levels in Malheur, Mud and Harney lakes. Many hours were spent by refuge personnel digging out water levels, maps and correspondence for this cooperative effort. The main result was a determination by COE that drainage of water out of this basin via the Malheur River is not feasible for a number of reasons.

Breeding bird surveys were completed for the FWS Patuxent Wildlife Research Center, mourning dove coo counts were completed for ADC, golden eagle nest data and waterfowl census data on BLM lands were provided to their District Office in Burns, and quarterly raptor censuses were shared with BLM and ODFW personnel. Bald eagle roost counts near Burns were handled cooperatively by BLM, USFS, ODFW and refuge personnel.

2. Items of Interest

Maintenance Mechanic Bill Aulbach suffered a heart attack on the day after Christmas. His recovery is expected to take several months. Assistant Secretary Ray Arnett visited the refuge in April. He reviewed the grazing program with Regional Director Dick Myshak, Associate Director Bob Gilmore, Deputy Director Bob Putz and Manager Mazzoni.

Ethen and Mary Perkins arrived at the Malheur Field Station in June. Ethen was selected to replace Denzel Ferguson as Director. Mazzoni, Ditto, Ehlers and Paullin met with the Perkins' to discuss the annual program. Former refuge biologist and retiree Dr. Ray Erickson and family visited the refuge in August. Former Manager John Scharff accompanied them.

Manager Mazzoni was in Washington, D.C. from July 7-15 to develop a questionnaire for Bob Gilmore. The questionnaire was sent to personnel throughout the refuge system to help the Central Office define national issues and concerns.

Brad Ehlers, Larry Ditto and Charlie Yriarte served on jury duty during the year. Refuge personnel assisted the local Rotary Club with the first annual Harney County Migratory Bird Festival in April. Tours of the Harney Basin, including the refuge, were given and programs were presented to approximately 200 local people during this event.

Mazzoni was active in the local Lions Club and the Burns Chamber of Commerce. He also served as Secretary-Treasurer of the Oregon Chapter of the Wildlife Society. Larry Ditto and Brad Ehlers served on the local Sodhouse School Board. Brad also was elected as President of Peace Luthern Church in Burns. Dave Paullin was active in the Lions Club and the Holy Family Catholic Church in Burns.

IN	OUT	REFUGE	MANAGER	COMMENTS
	2/28/83	Malheur	Joe Mazzoni	Greetings!
3/2/83	3/15/83	Sheldon-Hart Mt.	M R. Knechtle	Excellent
4/3/83	4/5/83	Modoc	Clark Bloom	Another excellent report.
4/5/83	4/13/83	Klamath	Basin RC Supervisor	
4/19/83	4/21/83	S.F. BAY NWR	Joseph D. Johnson	A High Class Prototype!
4/25/83	5/3/83	Sacramento NWR	Ed Collins	
5/4/83	5/9/83	Desert NWR	Earl Wisler/Acting	
5/25/83	5/25/83	Salton Sea NWR	Tom Mason	
6/3/83	6/8/83	Kofa NWR	Milton Hadeglia	
6/10/83	6/13/83	Imperial NWR	Bill Behrends	
	6/16/83	Cibola	Martin	
6/29/83		Havasu	Ty Berry	Hello Joe!
7/12	7/13/83	Cabeza Prieta	Jim Fisher	
7/14/83		Bosque	Bill Hutchinson	
8/8/83	8/9/83	Muleshoe	Rod Krug	
9-6-83	9-12-83	Wichita Mts.	Bob Kaiser	
9/14/83	9/27/83	Wichita NWR	Ken Butts	Enjoyable rept.
10/3/83		Cross	Frank Parker	
10/8	10/12	HAGERMAN	John Williams	Good visit work going on!
10/15	10/19	Tishomingo	Larry Ivy	
10/22		Sequoyah	John Akin	
10/31	11-1	Salt Plains	Earl McMullen	
11-7		Big Lake		
11/15/83	11/16/83	Tennessee	Carel Kuyper	
11-30	12/02/83	Cross Creeks	Vicki Crisp	
12-05-83	12-16-83	Reelfoot	Wendell Crews	
12-18-83	1-[illegible]-84	Hatchie	Dean Rundle	
1-11-84	1-16-84	Wapanocca	Tyrone Tilley	

Dave Paullin finished his commitment to the Columbia White-tailed Deer Recovery Team in February. This duty was a holdover from Dave's Area Office responsibilities. The Olympia Area Office was phased out in August, moving those duties into the Portland Regional Office.

3. Credits

Staff photo page	Arlene Miller
Table of Contents	Arlene Miller
Personnel/Review	Ruth Warneke
Sections A,B,C	Joseph P. Mazzoni
Section D-1, 2, 3, 4	Joseph P. Mazzoni
Section D-5	Steven P. Thompson, David G. Paullin, C. D. Littlefield
Section E-1, 5	Joseph P. Mazzoni
Section E-2, 6, 7	Bradley D. Ehlers
Section E-4	Steven P. Thompson
Section F-2	Steven P. Thompson
Section F-4, 9, 10	Bradley D. Ehlers
Section F-5, 7, 8, 12	Joseph P. Mazzoni
Section G-1, 2, 3, 4, 5, 7, 8 10, 11, 12, 14, 15	Steven P. Thompson
Section G-6	Steven P. Thompson, David G. Paullin
Section G-16, 17	Bradley D. Ehlers
Section H-1, 2, 3, 5, 6, 7 8, 9, 11, 17	Bradley D. Ehlers
Section I-2, 3, 4, 5, 6,	Bradley D. Ehlers
Section J-1, 2	Bradley D. Ehlers
Section J-3	Arlene Miller

This narrative was edited by Joseph P. Mazzoni and typed and assembled by Dee Dee Ehlers and Arlene Miller.

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IN	OUT	REFUGE	MANAGER	COMMENTS
1/17/84	1/26/4	White River	Marvin Hurdle	
1/30/84	2/6/84	Yazoo	Tom Wilkins	
2/9/84	2/15/84	Felsenthal	Bob Bridges	Impressive area!
2/21/84	2/24/84	D'Arbonne	Daniel W Doshier	
2/23/84	2/27/84	CATAHOULA	Jim W. Wigginton	
3/22/84	/	MSC NWR	[illegible]	
4-9-84	4-13-84	Choctaw	Jerome Carroll	
4-16	4-19	NOXUBEE	Tisdale	Hello Joe
04-23-84	04-25-84	Wheeler	Thos. Z. Atkeson	
05-01-84	05-11-84	Eufaula	Don Tingle	
05-14-	05-16-84	St Vincent	Martin Perry	
5-17-84	5/27	St. Marks	Joe A. White	
5-30-84	6-4-84	Chassahowitzka	G. Carowan	
6/6/84	6/6	"Ding" Darling	Ron Hight	
6/18/84	6/19/84	National Key Deer	Bonnie Bell Acting RM	
6/25/84	6/25/84	Caribbean Islands	Sean Furniss	Good Report Joe
6/28/84	6/29/84	Culebra	John Taylor	
7-2-84	7-9-84	Loxahatchee	Thomas H. Barnes	
7-13	7-17	Hobe Sound	Stuart Marcus	
7/19	7/20	Merritt Island	Stephen R. Vehrs	Regards Joe
8-3-84	8-6-84	Lake Woodruff	Leon Rhodes	
8-8-84	8-20-84	Jacksonville	W Metzen	
8-21-84	8-29-84	Okefenokee	John Schroer	
9/15/84	9/26/84	Ga Coastal	J. P. Davis	
10/2	10/9	Piedmont	Ronnie Shell	
10/12/84	10/17/84	Cape Romain	G. Harris	
10/22/84		SANTEE NWR SUMMERTON, SC	Glen Bond	
10/30/84	11/7/84	Carolina Sandhills	Ronald C. Snider	

IN	OUT	REFUGE	MANAGER	COMMENTS
11/08/84		PEE DEE	M. Bruce Blihovde	Good Job.
11/28	11/30	Pea Island	Alton Dunaway	
12-13-84	12-04-84	Cedar Island	Hubert Brohawn	
12-6-84		Mattamuskeet	Larry R Ditto	Outstanding as usual, Hello to all.
12-14-84	12-20-84	Back Bay	Ralph Keel	
12-24	1/02/85	Great Dismal Swamp	[illegible]	
1/7/85	1/9/85	PRESQUILE	BARRY BRADY	
1-10-85	1-14-85	Chincoteague	Denny Holland	D. Ho D. HO's Comment
1-17	1/22	Blackwater	Don R. Perkuchin	
1/25	1/29	Mason Neck	Thomas W. Stewart	
2/1	2/4	Eastern Neck	H Olson	
2/5/85	2/14/85	Prime Hook	George F O'Shea	
2/21/85	3/14/85	Bombay Hook	Carl D. Daly	hold to stagger
3/15/85	3/18/85	EDWIN B FORSYTHE BRIGANTINE DIVISION	Paul D Caldwell	
4-8-85	4/8/85	ninigret	Charles Blair	
4/10/85	4/26/85	Wertheim	Roger A. Spaulding	
4/30/85	5/9/85	Great Swamp	William Koch	
5/10/85	5/17/85	Tinicum	G E Frazer	
5/21/85		Erie	Tom Mountain	
6/2	6/6	IROQUOIS	Ed Chandler	
6/11	6/14	Montezuma	Grace Hackett	Good work, Joe & all...
6/17	6/18/85	MISSISQUOI	Robert A Zelley	
6/21	7/8/85	Moosehorn	Doug Mullen	
7/9	7/10	Petit Manan	T. Goettel	
7/12	7/17	Rach. Carson	J. Fox	
7/22	7/24	Parker River	J Fillio	
7/26	7/29	Great Meadows	Lloyd Culp	
11/4/85	11/15	Ottawa	Michael Tansy	

IN	OUT	REFUGE	MANAGER	COMMENTS
11/18	11/21	Muscatatuck	Lee Herzberger	
11/25	11/27/85	Shiawassee NWR	Joe Hardy	
11/29	12/06	Seney NWR	Don Frickie	
12/15	12/18/85	Horicon	D. Bigger	
12-31-85	1-3-86	Necedah NWR	Jim Gerell	
1/6/86	1-14-86	Upper Miss	Jim Fruntanbr	
1-21-86	1-28-86	Trempealeau	Bob Drieslein	
2/3/86	2/3/86	La Crosse	RS	
2/24/86	3/4/86	Chautauqua NWR	T. Sanford	
3-5-86		Crab Orchard NWR		
3/11/86	3/12/86	Calhoun NWR	D Peyton	
3/16/86	3/14/86	Mingo	Eric Sipco (Acting)	
3/19/86	3/24/86	Clarence Cannon	Ross Adams	
4/3	4/4/86	SWAN LAKE	JACK FRYE	
4/8/86	6/17/86	Mark Twain NWR	Bob Stratton	
4/21/86	4/25/86	Louisa NWR	Wayne Stanley	
4/28/86	5/2/86	Squaw Creek	Devlin Heck	
5/5/86	5/7/86	DeSoto	George E. Gage	
5/9/86	5/12/86	Union Slough	John Packer	
5/19/86	5/22/86	Fergus Falls WMD	[illegible]	
5/27/86 still a stagger	5/30/86	LITCHFIELD WMD	M. KERSCHBAUM	
6/6/86		Rice Lake NWR	Dave Heffernan	
6/13/86	6/24/86	Morris WMD	[illegible]	Hi people!! Still a few of the old troops left
6-25	6/27/86	Big Stone	J W Heinecke	
6/30/86	7/13/86	Sherburne NWR	[illegible]	
7/15/86	7/18/86	Mn. Valley NWR	E Crozier	
7/18/86	7/21	Tamarac	Donald Uhle	
7/22/86	7/30/86	Detroit Lakes WMD	Howard A Lipke	

IN	OUT	REFUGE	MANAGER	COMMENTS
8/3/86	8-13-86	Agassiz	Joe K. Hok	
8-19-86	8-22-86	Rainwater Basin WMD	Trost	
8-25-86	9-3-86	FORT NIOBRARA-VALENTINE NWR COMPLEX	Bob Ellis	
9/11/86		Crescent Lake NWR	George Weber	
9/24/86	10/22/86	Lacreek	Rolf H. Kraft	
10/24/86	11/7/86	Lake Andes NWR	Bill Wilson	
11/10/86	11/13/86	Madison WMD		
11/14/86	11/21/86	Sand Lake NWR	Jerry Walters	
11/24/86	12/4/86	Waubay NWR	John Koerner	
12/6/86	12/18/86	Tewaukon NWR	B E Hoflen	
12/19/86		Valley City WMD		
12/30/86	1/5/87	Devils Lake WMD	Roger Hollevoet	
1-9-87	1-20-87	Arrowwood NWR	John R. Foster	
1/23/87	1/27/87	KULM WMD	Michael M. Murphy ACTING	HELLO BRAD & FAMILY.
1/28/87	1/29/87	Long Lake NWR	Milton M. Ense	
2/2/87	2/9/87	Audubon NWR	Dave Potter	Some Refuge - Hi Joe & CDL The years go by!
2/9/87	2/9/87	Lake Ilo NWR	Kevin Willis	
2/11/87	2-16-87	J. Clark Salyer	Bob Howard	
2-17-87	2-19-87	Upper Souris	Dean F. Knauer	Great Refuge
2.23.87	2-25-87	Des Lacs NWR	Del Pier	
2-25	2-26-87	Lostwood	L. Smith	
2-27-87	2-27-87	CROSBY	T Kessler	
3/2	3/6	Medicine Lake	Chad Fuller	
3/9	3/20	CMR Fort Peck	Ryan Maus	
3·23	3·24	CMR Jordan	Greg Siebenaler	
3-27	3/30	CMR Sand Cr.	E. Williams GH	
4/1	4/6	BOWDOIN NWR	[illegible]	
4-9-87		CMR Lewistown.	Ralph L. Fries	

IN	OUT	REFUGE	MANAGER	COMMENTS
4/16	4/22	Benton Lake	R Gearson	Always enjoy this one, Great Area!
4/23	4/24	Bison Range	Jon Malcolm	Howdy all
	4/28	Lee Metcalf National Wildlife Refuge Stevensville, Montana 59870		
4/29	4/30	Swan River NWR	R. Washtak	
5/6	5/8	[illegible] Rock Lake	[illegible]	
5/12	5/28	National Elk Refuge	[illegible]	RM Good job. Hi Jo & Brad
6/4/87	6/4/87	Fish Springs NWR	Charlie Darling	
6/8	6/10/87	Ouray	Keith Hansen	
6/15	6/18/87	Browns Park	Jim Creasy	Hi Brad!
6/23	6/30/87	Seeds Kadee	Dick G. Ibert	
7/09/87	7/16/87	Arapaho	Eugene Patten	
7/20/87	7/22/87	Flint Hills	Dave Wiseman	
7/27/87	7/30/87	Kirwin	Milt Suthers	
7/31/87	8/4/87	Quivira	Karen Cartlidge	
8/24/87	9/10/87	Yukon Delta NWR	Ron Perry	
9/15/87	9/23/87	Arctic NWR	Phil Garrett	
9/24/87	9/28/87	Kanuti	[illegible]	
?	10/26	Yukon Flats	Lou Swenson	
11-2-87	11-3-87	Koyukuk	Mike Nunn	
11/13	11/16	Nowitna	Jim Fisher	
12-7	12-8	Innoko	[illegible]	
12/21/87	12-31	SELAWIK	[illegible]	
	2/2/88	Togiak	[illegible]	
2-6-88	2-11-88	Tetlin National Wildlife Refuge	[illegible]	
	2-19-88	AK Pen / Becharof	Ron Hood	
2-25-88	3/8/88	[illegible]	Michael [illegible]	
3/15	3/25/88	Aleutian Is Unit Adak, AK		
3-28	4/11	Kodiak NWR	Kevin [illegible]	Acting

IN	OUT	REFUGE	MANAGER	COMMENTS
4/14/88	4/18/88	ALASKA MARITIME NWR	John L Martin	
4/19/88	4/22/88	Kenai N.W.R.		
? * 5/30/88	6/10/88	Hawaiian Islands	[illegible] Leinecke	Nice report, Joe + troops
6/15/88	6/22/88	Nisqually NWR Complex	Bill Hesselbart	Nice report —
6/29/88	7/6/88	Protection Island N.W.R. Dungeness N.W.R.	Nancy Curry	
7-8-88	8/1/88	WILLAPA NWR	Jim Hidy by E. Dueker	
* 8/8/88	11/28/88	CWTD NWR	Rich Vetter	
11-28-88	12/14/88	Ridgefield NWR	Jim Clapp	
12/15/88	12/15/88	Conboy Lake NWR	Harold Cole	
12/20/88		Wm Finley	P Sekora	
1/4/89	1/7/89	Ankeny	Scott M. Stenquist	
1/7/89	1/7/89	Baskett Slough	R. Lettenmaier	
1-13/89	1/15/89	Toppenish	D. Fenn	
1/18/89	1/20/89	Columbia NWR	Dave Goeke	a lot of water has come and gone since 1982
1/23/89	1/27/89	Kootenai NWR	Larry Napier	HI FOLKS!
1/30/89	2/10/89	Turnbull NWR	Ralph Dobbe	
2/14/89	2/15/89	McNary	Dave Linder	
2-15	2-17	Umatilla Complex	"Moe" LeFever	
2/24	2/28	Deer Flat	Jim Messerli	
3/1		SE Idaho Refuge Complex	/S/ CHARLES S. PECK	
APR 05	APR 11	RUBY LAKE REFUGE	Dan Pennington	
4-17-89	4-25	Stillwater WMA	Ron Anglin	